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OF
CHICAGO

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CONTENTS

Contribution by Major Kellogg Speed, M. C., U. S. A. SURGICAL CASES AT AN A. E. F. EVACUATION HOSPITAL	PAGE 1
Contribution by Lieut.-Colonel Frederic A. Besley, France SECONDARY HEMORRHAGES AS OBSERVED IN WAR SURGERY	23
Clinical Lecture by Dr. Victor D. Lespinesse, Northwestern University BLOOD TRANSFUSION	35
	47
	47
	51
	57
Clinic of Dr. Frank Edward Simpson, Cook County Hospital RADIUM IN MALIGNANT DISEASE. DEMONSTRATION OF 3 PATIENTS TREATED WITH RADIUM	63
Case I—Cancer of Base of Tongue and Epiglottis	63
Case II—Cancer of the Tongue	67
Case III—Epithelioma of the Face	70
	75
	81
	80
	97
	103
	107
	115
Clinic of Dr. John R. Harger, Surgical Department of the University of Illinois SARCOMA OF THE LIVER IN A CHILD OF SEVENTEEN MONTHS. SARCOMA OF TESTICLE, WITH METASTASES IN THE LUNG SUGGESTING TUBERCULOSIS	121
Clinic of Dr. Gustav Kolischer and Dr. J. S. Eisenstaedt, Michael Reese Hospital REPORT OF FIVE CASES	131
Case I—Traumatic Rupture of Kidney	131
Case II—Nephrolithiasis	134
Case III—Nephroblastoma	135
Case IV—Impacted Ureteral Stone	139
Case V—Syphilis of the Bladder	137
	139
	139
	145
	147
	149
	163
	177
	187
	187
	190
	194
Case IV—Impacted Intero-osticular Fracture of Neck of Femur	197
	201
	213
Clinic of Dr. A. J. Ochsner, Augustana Hospital HYSPADIAS EXCISION OF GANGLION FROM HAND	217
	223
Clinic of Dr. Maurice A. Bernstein, Wesley Memorial Hospital TALIPES CAVUS (TALIPES PLANIARIS, CONTRACTED OR HOLLOW FOOT)	227

SURGICAL CLINICS OF CHICAGO

Volume 3

Number 1

CONTRIBUTION BY MAJOR KELLOGG SPEED M C,
U S A

SURGICAL CASES AT AN A E F EVACUATION HOSPITAL

Summary General remarks—work of the American surgeon in France—general types of wounds and indications for operation—watchfulness of non operated bullet wounds—splinting and dressings—the night's work in its general run

Case I—Technic of operation use of x ray Carrel Dakin treatment little points about knee-joint additional notes on case Septic knee-joints—the latest treatment—dra nage plus motion no splinting team records

Case II—Description of wound with physical examination remarks on nerve and spine lesions treatment—contra indications for operation value of commencing orthopedic care early progress of case

Case III—Description—blood vessel injury course to be pursued indication for operation amputation of leg—technic—the circular flap—bone sawing pathology treatment of severed nerve sheath remarks about excision of head of fibula false aneurysm—ligation of popliteal artery dressing amputation stump

Case IV—Description pathology—severed brachial artery necessity for careful pre-anesthetic examination severed median nerve peripheral nerve repair clinical course of suspected nerve lesions rules for nerve injuries about elbow technic of nerve suture—use of a fat flap as a covering for the sutured nerve additional notes

Case V—Use of De Page anesthesia—formula

THE status of the surgical work at our Evacuation Hospitals is one of keen interest to us at this time affecting some of us personally on account of our wounded friends and relatives and because we as Americans are interested in a comparison of our own medical services with those of the Allied forces Are American surgeons making good in this new aspect of their professional work, are they profiting by the surgical lessons learned by the other armies, and are they showing the result of their excellent training in the army work before they reached France? In our national pride we feel that a group of average medical officers, selected from the thousands in the service can give as good an

account of themselves in either an administrative or professional way as a similar group from any army. Consideration of the length of lines of communications and their incidental difficulties together with the local problems to be solved in all new temporary hospitals will not alter our hopes in these men to make good and the results already obtained may be said to be above expectations.

Most of the actual advance area surgery is performed by casual surgical teams composed of three officers an operator an assistant and an anesthetist a nurse and an orderly of the medical corps. Any number of teams can be used at a given point depending on the battle and the number of wounded requiring attention. In the operating tents and rooms we must know something of the conditions arising in front of us and from the character of the wounds the men present we are able to satisfy our thirst for direct information as to the nature of the fighting. When shrapnel wounds predominate as they do in trench fighting and preliminary bombardments we know that the wounded are fairly limited in number because men have cover. As we chase the Boche however and bullet wounds rise sharply in proportion to the whole we know the enemy resistance is falling he is depending on rifle and machine-gun fire and that the continuation of the drive with its wounded stream to the rear promises to be prolonged. The technical surgical work also varies with the battle in accordance with this proportion of shrapnel and bullet wounds. In heavy artillery fire and stationary warfare the dirty ragged wounds of shrapnel and high explosives necessitate early and careful removal of foreign bodies incased cloth and metal and the minute debridement of damaged tissues. Thus not only is early healing obtained and later suppuration avoided but the dreaded gas and other anaerobic infections are reduced to an amazingly small percentage. On the other hand when through and through bullet wounds received at close range and from missiles of high velocity are in the majority the surgeon's work is considerably lessened in its minute technic. Foreign bodies are not present in the tissues the wounds are small and quickly heal over and the

danger of infection of all character is lessened. Even with comminuted fractures of long bones there is slight indication for operation—injuries to important nerve trunks and blood vessels or joint cavities offer the main exceptions. In bullet wounds we must avoid a tendency toward overoperating—conservatism and non interference are the best policies. These wounds must be particularly watched, nevertheless, for the development of gas infection *because they have not been opened and excised thoroughly and there has been no surgical check instituted against those infections*

One must revive all one's ideas of splinting, which, at least as far as metal splints are concerned, has become almost a lost art with us in the States. We have used plaster of Paris so extensively and successfully in civil practice that we have lost sight of the advantages of iron, wooden and wire splints. They are needed for these injuries although fracture may not be present which require immobilization, to give rest to parts and to offer support in the necessary jostle of transportation. Perhaps no phase of the work is more important than the use of splints. We can learn much from our orthopedic brothers and from the experiences of the British with their wonderful outfits for splinting wounds. The medical dressing officer in wards at the hospitals must learn to respect splints. No operator employs one unless it is indicated, and, as a rule, his pride will not permit him to have one leave his tables until it is satisfactorily applied. Too frequently a medical officer subsequently attending the patient is inclined to remove the whole splint for his dressing purpose, and not having much assistance nor the aid of anesthesia the reapplication of the splint may be inadequately performed to the patient's discomfort and the detriment of wound healing. It takes the ordinary officer but a short time to learn that he can do his dressings much quicker and with less hardship to the patient and to himself if the splint is left on. It is also true that many nurses become as expert at dressings as officers and while the officers must see the patient's wounds and advise frequently on the course of dressing, it often is impossible for them to perform more than a small percentage

of the actual work. The officer's time is better used in adjusting and inspecting splints and directing his ward service after attention to his records. If nurses are employed for dressing purposes their technic must be constantly checked over and the possibility of contamination from patient to patient absolutely avoided. Rubber gloves worn by dressers washed in an antiseptic solution between each service together with the use of boiled instruments alone will obviate the scattering of infection. A rigid routine must prevail.

Let us take the first few patients in order tonight as we go along to get an idea of the work and of the extent of the field in which the operator must be prepared to functionate.

CASE I—C J, — Infantry. His field card tells us that he was injured exactly forty two hours ago. As the orderly takes off the bandages we find these wounds.

1 Gunshot wound of the right scapular region penetrating with fracture of the right scapula.

2 Gunshot wound of the left knee penetrating inner aspect. Because of the number of wounded every one cannot be x rayed and as these wounds are serious and the patient's condition is none too good we must clean the wounds and attempt to find the foreign bodies without the help of a localization. That is not such a difficult task in some instances by following the wound tract. In others like the patient I was asked to see on my way to the tent it would be rather difficult to find the metal without an x ray screening. That man had been hit in the right shoulder and the missile a bullet lay just below Scarpa's triangle in the left thigh having traversed both chest and abdominal areas.

We shall start on the scapular wound first. It is very dirty and there are soiled ragged edges with unburned dirt and grass sufficient evidence that the cause was a piece of shell. A very narrow soiled skin edge is removed from the transverse entrance wound and then the skin across the back must be laid open to follow the missile's track. The right scapula is fractured below the spine into the body of the bone and as I follow the path toward the left side I find a hole punched in the left scapula and the piece of metal lying in the muscular tissue behind the left

shoulder showing that it has traversed clear across the back slightly damaging the spine of the fifth dorsal vertebra. But to expose this soiled track and to excise its dirty tissues requires an enormous wound and the shock to the patient is to an extent proportionate to the length of skin opening the amount of blood lost and the duration of the anesthesia.

We have removed the foreign body stopped the hemorrhage after debridement and now lay in the wound a single spread-out layer of coarse-meshed gauze. On top of this projecting from the ends of the dressings I will place Carrel tubes eleven in all. The irrigation of the Dakin's solution through them must not be started at once because we have a very large surface here which wishes to bleed and a wet dressing would increase and prolong the slight oozing by capillary action. Hence we put on dry dressing and begin the introduction of the Dakin's solution tomorrow morning. On the table here we have effected a mechanical sterilization of the wound by cutting away all the soiled tissues. Tomorrow when the irrigation is started a follow up chemical sterilization will be inaugurated.

As the patient has now been turned over on his back and his foot is held up in the loop swing the orderly quickly shaves the thigh and knee and the skin preparation is finished. Again this ragged wound on the upper and inner aspect of the thigh above the knee is carefully debrided by cutting away soiled tissue. As I progress every care is taken to avoid the thin wall of the subcrural pouch of the knee joint which must lie extremely close to the depth of the laceration. Following the wound down on the inner aspect of the knee I find that it leads to the tibia which is here exposed and sticking rather deeply in the inner tuberosity of the tibia is the piece of metal. I dig it out and cleanse the wound and still I am unable to see or discover an opening into the synovial covering of the knee joint. It is possible if the knee joint were distended to exert pressure on it and if even a small exit existed from the joint cavity the fluid within under pressure would be forced out to aid the surgeon to locate the hole. This joint is not so distended but it might be distended by the introduction of normal salt solution.

and the expression method attempted. I am unwilling however to attempt that under the conditions in which our surgery is performed.

The wound is left wide open. No Carrel tubes are inserted in it because it drains perfectly and if infection arises in it let us hope that it will seek the easiest path out through the open cutaneous wound and not into the joint. A Thomas splint is applied and the knee is kept at rest to favor drainage and absence of motion which might suck infection into the joint through an undiscovered hole.

The prognosis for these extra articular wounds is good. The patient should recover without a pyarthrosis much depending on the presence of a minute opening into the joint.

Additional Notes—For three days the patient did fairly well in spite of his enormous back wound and chest contusion. On the fourth day his knee became slightly swollen. That night it was aspirated on the uninjured side and the fluid obtained was cultured. Streptococcus was found and on the fifth day the joint was widely opened by lateral incisions for the extent of the joint and its subcrural pouch. The Thomas splint was removed and the man was encouraged to move his leg to force the pus out of the joint by its own motion. At first this was painful but after a couple of days he could flex the thigh almost to a right angle unaided. All dressings were left off and the knee lay on a large sterile pad into which the pus ran. A cradle held off the bedding. He was encouraged to move the knee and twice a day it was passively flexed by the ward medical officer. The motion is depended upon to force the pus out of the openings and to provide complete drainage until the individual's resistance overcomes the infection and the suppuration ceases.

For a while his condition improved his temperature dropped but his scapular wound did not do very well. A severe septic downward course supervened and on the twenty-seventh day death followed.

No autopsy was possible as we left the station that day and there were no facilities for any examination.

I had desired to follow a series of frankly septic knee joints treated by lateral opening and movement, but my recent work has been in front line surgery away from sepsis and the opportunity has not presented itself. This method of full open drainage has long been in vogue. The addition of movement is newer. I treated many septic knees while in service with the British Expeditionary Forces in 1916, but, for the most part, they were immobilized or irrigated by different antiseptics. At this time in the frank pyarthritides we are using drainage plus motion, and on the whole the results are going to be better. Reports on a series of these infections will be forthcoming soon.

While the orderlies were putting the dressings and splint on the patient the anesthetist has already passed along to the next table where another wounded man awaits attention. We keep our own team records entirely separate from the hospital records for the information of the team head in cases of referred inquiry and interest and as a protection against errors by others in the hospital. With so many teams at work it is wise to adopt this method. It also gives one the figures for compilation of a statistical monthly report to the chief surgeon in which it can be shown what the team has done, what classes of patients it has handled and what the immediate results have been.

CASE II — This next man is Corporal G. A. G., — Infantry, injured just nineteen hours ago. The lieutenant always seeks my approval before starting the anesthetic unless there is an extremely evident indication for operation. Upon examination of the corporal I find that he has sustained a gunshot wound of the left side of the neck from a machine gun bullet. The missile has passed clear through; the entrance wound is located just in front of the anterior border of the sternocleidomastoid muscle about halfway down its length, and the exit is here almost directly over the seventh cervical vertebral spine. Observe how rigidly he holds his head, and how he complains when any movement of his body which affects his neck or trunk is performed. He complains of severe radiating pains about his left shoulder and down his arm, and claims he cannot move his left arm. To a slightly lesser degree there are similar sensations of pain and

loss of power in the right shoulder and arm. By going deeper into the examination I find that the condition in the right arm is that of a partial paresis, the muscle movements are slow and painful, and yet they are actively possible. In the left arm, however, the side of the injury, the paralysis seems at first complete. After encouragement and many attempts I can elicit slight pronation and supination of the forearm, and some power in the triceps, deltoid, and trapezius. The hand, nevertheless, lies inert and powerless.

From this weakness, combined with pain, we can conclude at once that there has been at least a contusion of the nerves of the left cervical plexus—there may be severance or there may be a contusion of the whole spine, involving a level from the third cervical down to the first two dorsal because we find the pain and weakness present on both sides—a hematomyelia may be present and spreading. We have no advantage in the help of a Roentgen plate here. It is a through and through wound and the missile undoubtedly has passed out. In this advanced and rapid life-saving surgery we are in luck to have foreign body localizations. In a short time we can anticipate that our army Roentgen department will furnish us with those admirable celluloid plates which are light and non breakable and can be transported with the patient. In a selection of patients for Roentgen examination this man, possessing a too evident through and through wound is wheeled out and sent direct to a surgical table for attention. Consequently we have only clinical findings to aid us in a diagnosis of fracture of the bony spine and injury of its precious nerve content. The physical findings then must be rapidly obtained and our conclusion must be based on them because there are many other wounded waiting.

The deep tendon reflexes are quite normal his knee-jerks are very brisk, but may be normal for him. The cremasteric and abdominal reflexes are sluggish. When I palpate the cervical region carefully I fail to find loosened bone or crepitus but on deeper manipulation the pain in the shoulders becomes severe. Accepting these findings and adding 1 per cent. experience to the 99 per cent. of evidence from the examinations I feel justified

in diagnosing probable fracture of the bony spine—at least of a transverse process of a vertebra about the fifth or sixth cervical—contusion of the spinal cord with some hemorrhage into the anterior horns and possibly destruction of some of the cells.

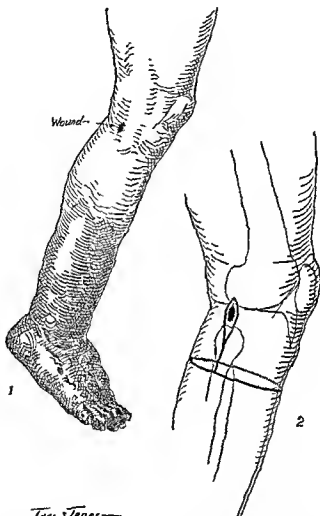
What shall my treatment be? First shall I operate on him?—what for? If I fear sepsis I might debride the track of the missile. Recall the path of this bullet and answer the question for me—can I quickly completely and successfully debride a narrow track which must pass within a fraction of an inch of the great vessels and nerves of the neck and involves the spine behind? It is not necessary nor is it anatomically advisable—I have tried to do it. We know that these through and through bullet wounds will care for themselves in a large percentage of their occurrence. Therefore I shall not operate but I will make the diagnosis I have mentioned and I will offer him treatment. That shall consist of three parts: first a simple sterile pansement over each wound; second an attempt must be made to hold his head still to prevent any displacement of the spine if he should cough, sneeze or move his head suddenly; third to prevent further hemorrhage following even simple head motion with more pressure on the cord and to decrease his pain by establishing a rigid neck. This position can be assured by a jury mast to hold his head in harness by suspension of a small weight over the head of his bed. But advanced military hospitals do not carry this leather harness and one of our purposes is to prepare the man for transfer to the base as quickly as possible. We do have cardboard however—handages come in cardboard boxes—and we will fashion a Thomas collar out of several layers of cardboard extending the head slightly and bandaging it in a stiffened position so as to hold it perfectly erect. The third field of treatment carries us to his left forearm and hand. That hand should be placed in extension the wrist held on a cock up Jones iron splint to avoid a tendency for the stronger flexors to overcome the extensors and prolong a drop wrist. By beginning his orthopedic treatment here nineteen hours after injury we may save him tedious months of massage and exercise to obtain a muscle balance. If I were positive the

radial nerve above were severed the operation of tendon transplantation for drop wrist which I described in the Clinics¹ last year might be done right here. I have no such positive assurance but I will take the precaution of using this splint.

Additional Notes—The patient was seen the next afternoon. He had much less pain and was grateful for the steadiness of his head. Left arm motion about the same. Right arm a little increased. He made steady progress. His wounds remained clean, and slowly the use of the muscles in his left forearm and hand returned. He was kept under observation nine days. Before that time the splint had been removed and twice a day massage was given the left arm and he was encouraged to use it constantly. When he left for the base the wounds were clean and healed but he still wore the Thomas collar. (See Case IV.)

CASE III—The next patient has been here before. He is Private V McC of the — Infantry received on this table twenty four hours after injury—that was three days ago. There was a through and through wound just below the lower border of the popliteal space of the right leg (Fig 1 1). We diagnosed a bullet wound from its aspects. The leg was hard cold and no pulsation could be felt in any of the ankle or foot arteries. Sensation was also lacking in the foot but there was no gangrenous discoloration and as he was very tired we took a chance on not operating after diagnosing injury of the popliteal artery probably complete severance. The foot and leg were carefully wrapped in thick cotton well above the knee and then suspended with the foot supported at a right angle in a Thomas splint the toes being left out for observation purposes. The next night his toes presented a slight capillary circulation and although the foot was still cold and there was lack of sensation we did not unwrap the leg preferring to give it more time before disturbing it. On the second night the foot was cold and blue halfway up the leg and there was absence of pulse and sensation. Tonight just before coming over I saw him and decided on amputation as high as we can perform it *below the knee-joint*. The small bullet wounds are fairly clean and my desire in this early ampu

¹ Surgical Clinics of Chicago Vol I No 1 p. 187



Tenn. Jones

Fig 1—1 Point of entry of bullet. Note that the lower two thirds of the leg is gangrenous and much swollen. 2 Circular incision for amputation of leg. Note the extension of incision upward so as to encircle the wound. This was made for the purpose of facilitating the dissection.

tation is to save the knee-joint by operating in a manner to drain the wound track and yet to utilize the still viable skin of the leg

After a delay should sepsis supervene in the leg or the wound, nothing but thigh amputation will suffice and even then we could anticipate a septic stump with a long illness. Early amputation is frequently the best course in war wounds of known blood vessel pathology when imminent gangrene threatens. Gas infections with a rapid spread are the bugbear. (See article by Speed on Amputations, Jour Amer Med Assoc, July 27, 1918)

A constrictor has been placed on the thigh. Our skin flaps are not square nor racquet shaped but one incision is made and that is circular, completely around the leg at this level just above the darkened area which indicates the arrested circulation (Fig 1, 2). The skin and superficial fat are dissected back rapidly. A point is soon reached where the flap refuses to fold back further, that is obviated by a lateral incision parallel to the long axis of the leg over the fibula, I usually make it immediately after the circular cut. That permits the flap of skin to be turned back cuff like as far as one wishes. Both bones are sawn off, the fibula first slightly higher than the tibia and bevelled in and downward. You observe that I reverse the saw and use the cutting edge upward. That saves me from crouching down on the floor beside the patient and accomplishes the same purpose as if I had turned the patient over on his face and flexed the leg on the thigh—the very best position of all to use in these leg amputations. The tibia is severed by first beveling the sharp anterior edge by an oblique cut just below the tibial tubercle to save the insertion of the patellar tendon, and to avoid the knee-joint. There remains then only skin the two bones, and the stumps of the gastrocnemii with the blood vessels tucked in between and behind. Here I find two quite large vessels. Evidently I am just below the bifurcation of the popliteal, but apparently above the wound track. The portion of the vessel severed by the missile is probably in the removed leg and we can examine it after the operation is finished. These vessels are tied and the nerve is shortened until it draws back well covered. I frequently close the nerve sheath after its shortening when dealing with the sciatic and other large nerve trunks to protect the end of the axis-cylinders from cicatrization and from

infection arising in the stump That can be accomplished by a stitch or two of catgut It has been suggested that the end of the nerve need not be cut off short that it can be ligated above the severed end by a series of mattress stitches which result in the death of the distal portion of the stump My idea has always been to avoid the conveyance of centripetal impulses over the large nerve trunks in amputation—to handle them gently and to cut them quickly On the operating table I have several times had the anesthetist keep a record of the blood pressure clear through the operation Severance of the soft parts is not a large factor in lowering this pressure but invariably after a nerve severance the pressure tumbles abruptly Consequently, my respect for the nerves and a failure to take up ligation of them in their continuity As the nerve proper retracts however it seems an excellent step to close a large open sheath distal to the nerve and without compressing it That is sometimes necessary to control hemorrhage from the vessels in the sheath It should be used whenever subsequent sepsis is feared

May I say a word here also about excision of the head of the fibula in the amputations just below the knee This is performed on theoretic grounds to give a stump of one solid bone the tibia and also to avoid pressure on the outstanding peroneal nerve in its course around the fibular head from the hoot of the artificial leg You note I said theoretic—it seems to be largely theory In practice what happens especially in war amputations where the risk of sepsis in stumps is nearly unavoidable? In removing the fibular head a small connection to the knee-joint may be caused when ligaments are detached or a small natural connection may be patent The sepsis in the short leg stump easily finds a path thereby to the knee-joint and an infected knee results I have seen several instances of this course of events—one resulting in death others in secondary thigh amputation and now I never remove the head of the fibula

We cannot close this stump First of all it is against orders Remember we are doing military surgery and some general rules must be made by those in authority for the welfare of the greatest number of injured and second because we are not quite

sure of the blood supply of these skin flaps. There remains only the constrictor to be removed.

When that is done you notice the enormous stream of blood that spurted out on me, and immediately the constriction is tightened again. What is the trouble? Did we fail to ligate the arteries or did the ligature slip? Not at all. We are dealing with a false aneurysm of the lower end of the popliteal artery, the result of gunshot (Figs 2, 3). It has retracted up into the fatty tissue, about the vessels and the ligatures I applied are below it. The incision through the muscle belly cuts through

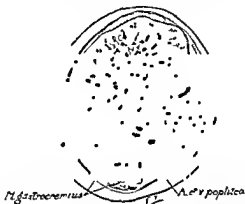


Fig 2—Cross-section of the leg slightly above point of amputation, showing the relation of the tibia and fibula and location of vessels and nerves.

the false wall and the blood stream shot out as from an open artery. I know that is so because I have seen many of them, and here is the sac of the false aneurysm just as I explained. Our stump is very short below the knee-joint. If I go higher to dissect around this aneurysmal area I shall endanger opening the knee-joint behind—so I shall adopt a simpler method. The patient must be turned on his face. Through a 2½-inch incision in the popliteal space I quickly pick up the popliteal artery and ligate it, closing the operative wound with S. W. G. The vein is tied below and is uninjured. If my pathologic reasoning is sound there will now be no bleeding when the constrictor is

removed. You see the stump simply oozes a little, a fact we are glad to see because it prophesies that our skin flaps are viable. The slit side of the skin flap and the extreme corners of it on each side I will tack together with a silkworm gut leaving the center wide open *not* packed with gauze because that will cause him great pain to remove and may demand another anesthesia. A stitch or two in the flap corners will not interfere with drainage and it saves us much damning from the medical

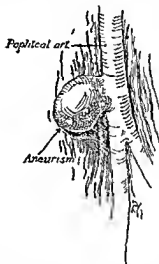


Fig 3—Sketch of the aneurysm of the popliteal artery caused by a severance of the artery just above its point of division. The sac was the size of the end of a small thumb. The pressure of the blood in it had helped to cut off the circulation in the leg.

officer at the base who has to close this or watch it close and who cannot saw off more bone unless he reamputates above the knee. We have done so much base work that we know these points are intensely live ones and save much pain and distress to the patient and criticism of the distant helpless operator.

CASE IV—While the orderlies are finishing the dressing our next patient asks for a drink. He has been waiting a few minutes because we are a little slow tonight—it is cold and rainy, and we do not seem to get steam up properly. He is A T Private —

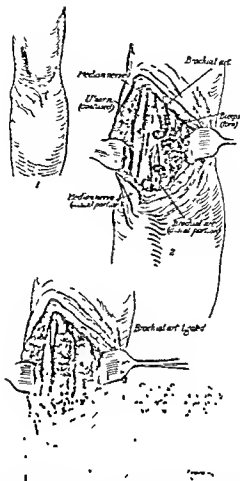


Fig. 4.—1 Wound just above elbow joint on anterior surface of the left arm. 2. Extent of damage caused by missile. Note blackened and curled-up ends of severed brachial artery. The median nerve has also been severed and the ends retracted nearly 3 inches. The ulnar nerve is somewhat contused, but otherwise undamaged. The biceps is somewhat mutilated. 3 The median nerve has been carefully joined by fine sutures, and a pad of fat taken from the thigh has been placed around this wound, the edges overlapped and sutures together. Two stitches are then placed in its sheath, anchoring it to the tissues in order to prevent slipping. The brachial artery has been ligated just above the damaged and curled up ends, and its damaged portion then excised. The ragged ends of the torn biceps have been clipped away.

Infantry injured thirteen and one-half hours ago by a piece of shrapnel just above the left elbow. The wound is here on the inner anterior aspect of the arm and is not so very large but is ragged and progresses distally in a superficial way. Before I decide on putting him to sleep—you see the anesthetist shakes his head thinking I will not need to—the arm and hand must be examined. The anesthetist has already been palpating this I know and as I do also it is evident why he considered general anesthesia unnecessary. Above the elbow and apparently slightly below the skin a metallic foreign body can be felt (Fig 4 1). By lifting gently the corner of the lower flap I see the dark metal and with a hemostat after a little manipulation of this puckered skin opening I can get hold of the missile. It is large. By some traction after several attempts it comes out. It is nearly 2 inches square—a very large piece—and you observe what a profuse hemorrhage follows its removal.

We will slip on a constrictor and anesthetize him. If the wound were superficial it might be possible to inject novocain solution $\frac{1}{2}$ per cent and do a debridement. When this skin is slit open and the cut away wound opening is enlarged down in front of the elbow we find the large soiled bed in which the foreign body lay. The early and unexpected onset of the hemorrhage prevented me from making examination of his hand to find out whether the nerves supplying the forearm and hand were intact. As I trim away this touselled biceps muscle I come to the severed end of the brachial artery. You can see how the darkened ragged ends have curled up and inward the distal end the same as the proximal and hemorrhage has been stopped helped perhaps by the presence of the foreign body but also by the rolling of the intima (Fig 4 2). As I ligate each end of this artery I go high enough on both parts to get above the damaged portions and in the ends removed are the clots which have plugged them. I must debride the damaged arterial ends just as much as I do damaged muscle because that tissue left behind might be the origin of sepsis. Further down toward the internal ep condyle of the humerus the ulnar nerve has been contused and damaged. The sheath shows some swelling

and hemorrhagic extravasation but nowhere does it seem to be punctured. Consequently I leave it alone. As I clean up this wound further I fail to find the median nerve which passes across the antecubital area. Here it is—or at least its proximal end—because it has been completely severed. This is a warning instruction—that the innervation of an extremity must be particularly inquired into before the patient is put to sleep no matter what portion of it is wounded. The only excuse in this instance was the hemorrhage which necessitated the application of the constrictor and our effort to hasten the anesthesia. The distal end has retracted well down here in the front of the elbow so that the skin must be further incised. There are the two nerve ends separated now nearly 3 inches. Before proceeding further the depth of this wound must be carefully debrided. There is no evidence that the elbow joint has been opened.

Can this hiatus in the nerve be bridged or must the wound be left thus with loss of nerve substance for fear of sepsis if I attempt some operation of nerve «plicing»? Should the nerve be cut longitudinally and a piece turned down to fit in this «space» or should I if it were physically possible make traction on the two ends and attempt to suture them together? In the first place it is fairly well demonstrated both by the physiologist and clinician that many late sutures of peripheral nerves are a failure. Consequently when a nerve «severance» is expected or the findings are suspicious the «suture» should be done at once. May I say to you however that in many fresh wounds, especially bullet wounds which give a finding suspicious of serious nerve damages or severance the physical findings of early examinations are often misleading. In my experience about 90 per cent. of these suspected nerve lesions are simply contusions with suspension of function and when the wound is examined the nerve is intact. When these patients are watched within a few days to two weeks full function returns in the muscles supplied by the nerve in that large percentage. That should aid us a little in deciding for or against immediate operation when the path of the missile has been in an unfavorable anatomic situation such as deep in the neck at the origin of the cervical plexus.

especially when the wound is a clean through and through bullet wound and there is little general indication for operation. Then we should carefully consider this point, and many times wait a few days at least before deciding that a whole plexus, or any given large nerve trunk has been severed. That is an important practical point in war surgery.

To return to this specific patient—to my mind nerve splitting and flap repairing are of no value—so I will not split the proximal end and turn down a half of the nerve trunk to meet the distal end. It is not possible to pull on these two ends and approximate them as you see. What shall I do? The answer is simple. I will flex the forearm to a right angle at least, and the two ends lie in easy apposition. Another point should be fixed in your mind. In the arm and about the elbow, loss of continuity in the median and ulnar nerves is not difficult to overcome, simply by flexing the elbow or by bringing the ulnar forward across the antecubital space out of its bony channel about the humeral condyle. Injuries of the radial (musculospiral) are not so easily handled especially when they are on the back of the arm and involve the nerve in its course around the humerus. There the nerve cannot be released by arm posture.

The nerve ends are now found cut off cleanly, and approximated the wound has been mechanically cleansed and now I must suture the nerve. Mattress stitches are introduced on at least three sides of the circumference of the nerve sheath, *through the sheath only*, with the finest silk we have, and when all are tightened and tied the axis cylinders within lie in contact (Fig 4-3). But they have not been injured by the stitches, nor are they compressed by them and the conditions are as favorable physiologically for nerve union as we can make them.

In spite of the mechanical cleansing of the surrounding wound it is still potentially septic, therefore I must prolong my operation to endeavor to protect this nerve suture. That I will do by quickly opening the lateral surface of the thigh on

out injuring the fascia lata. That thigh wound is closed at once by silkworm gut stitches

The fat is wrapped around the sutured nerve like a cigarette paper around tobacco, and held by light catgut stitches, one or two of which also hold it to the surrounding structures so that it will remain in place. That will protect the nerve suture from some adhesions of scar formation in this wound area, and if sepsis occurs in the large wound it may save the nerve from infection while the suppuration is being overcome (Fig 4 3). The skin we shall close with silkworm gut, leaving a small vaselin gauze at the upper angle. If this forearm is extended in the near future it will pull out the stitches in the nerve sheath and ruin the attempt at repair. Again we must use a splint, although there is no fracture, and a Thomas right angled arm splint is put on over the dressings, with written instructions pinned on the outside, calling the ward officer's attention to the fact that the splint must not be removed nor the forearm once extended.

Note —The second day after operation the wound was dressed. Some discharge was present. A fresh drain was inserted and a moist Dakin dressing applied. The infection became increased in the next few days, and several skin stitches had to be removed. Gradually the condition subsided and from all appearances, came under control. The fat around the nerve remained intact, and did well in face of the infection. Some granulations began to appear, and after twelve days the patient had to be sent to the base with hope that the nerve connection was intact, and that the wound would gradually close. The thigh wound healed by primary intention.

We have spent considerable time on this patient but the effort is worth while both to him and to his country.

CASE V —The next patient is waiting on the other table. The lieutenant tells me it is a superficial though soiled wound. He is F. R. ———, Sergeant — Infantry. The wound is on the outer aspect of the right thigh a grazing G. S. W., with overhanging dirty skin edges. That wound probably does not go below the fascia lata—it may. We must excise it. There is no nitrous

oxid, and because the novocain infiltration demands some wait for full benefit, not to keep a table waiting I shall use the DePage anesthetic.

The wound area is first shaved and prepared. The anethetist has a circular bag of oiled silk with a purse string of tape about its base, and a small hole the size of a silver dollar cut in the center. This is lightly packed with cotton, and the use of the anesthesia, which takes effect quickly and will last five to ten minutes, is explained to the patient. His co-operation is requested namely that when this bag is drawn taut about his face, although he feels that he is smothering he must breathe in. The hole in the center permits some air to pass in, although the impervious mask is drawn about his face but this air, in passing becomes saturated with the mixture which we shall put on the cotton, and that mixture he will then inhale. We make up the solution fresh each time we desire to employ it. The formula is

Ethyl chlond	1 part
Chloroform	5 parts
Ether	24 parts

The preparation is made in a small bottle with a glass cork, or a large glass syringe barrel, to prevent evaporation. When this is mixed it is quickly turned into the cotton within the mask, which is folded down over the patient's face the purse string is drawn and he is instructed to breathe.

You will observe that the first two breaths are fairly deep then he gasps a little and wants to stop breathing but we encourage him. Soon he has to breathe and after a few struggles he is taking deep inspirations and within a minute is relaxed and best of all is anesthetized so that I can go ahead and operate.

Quickly the wound is excised, all soiled tissue is removed. In one place the fascia has been nicked, his subcutaneous fat has saved him from a wound through the muscle. All damaged tissue has been removed. This would be an ideal case for primary suture if we were permitted to perform them. The patient has not felt a thing. He has not moved since the first

struggles stopped. The operation is finished and the mask has been taken off his face and he still lies there as limp as a rag but with good color. Frequently when coming out of this anesthesia the soldiers talk or laugh or if they have full stomachs vomit. No untoward effects are found. It reminds me very much of the ether *rausch* I use frequently in civil practice for reducing shoulder dislocations.

And so the night goes on.

CONTRIBUTION BY LIEUT -COLONEL FREDERIC A BESLEY

FRANCE

SECONDARY HEMORRHAGES AS OBSERVED IN WAR SURGERY

Summary Secondary hemorrhage practically unknown in civil practice frequency of in war surgery source of secondary hemorrhage causes—hemolytic streptococcus the most active organism—careless use of Carrel Dakin solution considered a causative factor by many observers signs and symptoms—secondary hemorrhage from lung rare in war surgery treatment—temporary methods—necessity for ligation of vessel in every case of severe secondary hemorrhage where patient's condition permits frequency of secondary hemorrhage in compound fracture of the maxilla treatment of shock following hemorrhage value of artificial fluid to replace loss of blood best treatment transfusion—Moss's method of determining reaction of recipient's blood—methods of transfusion—indirect method the one of choice in war surgery—technic

THE present generation of civil surgeons had come to regard secondary hemorrhage as an avoidable complication, and it was a rare occurrence in civil practice even in hospitals where a large number of emergency accidental wounds were seen and treated. Aseptic technic and the early and prompt treatment of potentially infected wounds had resulted in minimizing extensive suppuration and reducing the number of secondary hemorrhages to a negligible figure.

Surgeons had become indifferent to the possibility of this serious sudden and often fatal complication. Secondary hemorrhage was rarely thought of and less frequently discussed. The advent of war with its thousands of infected wounds and injured coats of blood vessels soon gave convincing evidence of the frequency with which secondary hemorrhage occurred, and taught the necessity of guarding against it and of applying adequate treatment when it did occur.

The Source of Secondary Hemorrhage—The active bleeding in secondary hemorrhage may occur from either the artery vein or the capillaries the former being much the more severe and dangerous Venous hemorrhage is rarely fatal unless it recurs repeatedly and from a large vein. Capillary hemorrhage is rarely if ever serious

Causes of Hemorrhage—In discussing the cause of the hemorrhage it may be said without thought of contradiction that infection and subsequent suppuration is the underlying pathologic condition responsible for all secondary hemorrhage if in making this statement we consider the many modifying influences The chief modifying factor is injury to one or all of the coats of the vessel wall

General blood infection or bacteremia may be responsible in part for severe secondary hemorrhages as well as local suppuration. A general sepsis may predispose to hemorrhage by reducing the coagulability of the blood and this is particularly true in the cases of hemolytic streptococcic bacteremia A local spreading suppuration which tends to destroy the vessel walls and the thrombus within the vessel is the potent and determining factor in a secondary hemorrhage Obviously the hemolytic streptococcus is the most frequent and most active organism in the dissolution of the thrombus or the destruction of the vessel wall

In any given suppurating wound it must be quite evident that the distal portion of the clot which occludes the vessel and prevents the hemorrhage is always infected and necessarily exposed to suppuration but the more proximal portion of the thrombus remains aseptic and is the barrier preventing hemorrhage If the entire thrombus becomes infected and breaks down or a rupture occurs in the vessel wall hemorrhage ensues What are the factors controlling this phenomenon?

The relation between the virulence of the organism and the resistance of the tissues is always to be considered The hemolytic streptococcus is probably the most important and virulent organism in this connection in so far as solution and destruction of the protecting thrombus is concerned Careful observation

and investigation of many of these vessels seen clinically tend to show that dissolution of the clot alone rarely occurs and that this is usually accompanied by evident inflammation of the vessel wall as shown by exudation into the tissues of the vessel with subsequent rupture. Rupture is facilitated by any injury to the coats of the vessel wall.

Further study will probably demonstrate conclusively that inflammation of the vessel wall with accompanying rupture is much more frequently the cause of secondary hemorrhage than the dissolution of the protecting thrombus.

In the opinion of many observers Carrel Dakin solution used carelessly or in excess predisposes to the destruction of the thrombus and vessel wall. Injuries to the vessel wall occur frequently in penetrating war wounds and yet it is surprising how often the missile passes close to the vessel without injury to any of its coats. The injury to a vessel wall resulting in either a true or false aneurysm obviously predisposes to secondary hemorrhage which is much more apt to occur if suppuration ensues.

Signs and Symptoms of Secondary Hemorrhage—A secondary hemorrhage may be external occurring on the surface and therefore self evident or it may be concealed in the abdominal cavity the pleural cavity or into tissue spaces. Hemorrhage into tissue spaces rarely gives rise to dangerous symptoms unless it takes place first in a thigh where the injury has rendered the muscles capable of wide separation second in the retro peritoneal space in the abdomen or third into the loose tissues of the pelvis behind the peritoneum. The diagnosis of an external hemorrhage is not difficult but the severity of the symptoms produced is not always in direct proportion to the amount of blood lost. Given a patient weakened by prolonged sepsis and he will be more markedly affected by the loss of a relatively small amount of blood than the healthy robust man.

The visible external hemorrhage together with the evidence of shock as manifested by the pallor cold damp skin sighing respirations rapid pulse subnormal temperature and lowered

blood pressure enables us to make a diagnosis of the severity of the hemorrhage and its results. If the hemorrhage be internal or concealed one is obliged to make a diagnosis of its existence and severity from the symptoms and signs of shock plus the physical findings of fluid in the peritoneal or pleural cavities.

It may be said that the experiences of this war have taught that *secondary hemorrhage from the lung is so rare as to be almost disregarded*. A contralateral collapse of the lung which is frequently seen simulates very closely a secondary hemorrhage from the lung. Secondary hemorrhage into the peritoneal cavity occurs more frequently. One of the most common concealed hemorrhages occurs in the retroperitoneal space either in the pelvis or in the abdomen. These are often very severe and difficult to control.

Treatment.—At first thought the treatment of secondary hemorrhage particularly from an external source would appear to be a relatively simple procedure. It can be stated fairly however that secondary hemorrhage is a complication that often taxes all the skill and mature judgment of a surgeon with a large experience in war surgery. The treatment is rendered more difficult by reason of the local and general sepsis that usually if not universally accompanies the bleeding.

Frequently a severe hemorrhage will stop spontaneously or be checked with local pressure. The application of a constrictor for a few minutes results in the stopping of the bleeding with no immediate recurrence when this constrictor is removed. This gives a false sense of security. Surgeons of limited experience with this condition are often tempted to let well enough alone and delay. This procedure is rarely if ever permissible. If the hemorrhage has been at all severe or if it has produced any material constitutional disturbance immediate treatment should be instituted. Experience has taught that no severe hemorrhage occurs without the opening of a large artery or vein usually the former.

Almost without exception a subsequent larger and frequently fatal hemorrhage will recur unless the vein or artery effected

be securely ligated and adequate drainage provided for the control of the local suppuration

It should be a universal rule that ligation of the vessel should be practised in every case where a severe secondary hemorrhage has occurred as soon as the patient's condition warrants the operation. No attempt should be made to carry out this procedure in a ward but the patient should be removed to a well equipped operating room at once and the operation regarded as a major one with careful observance of a thorough aseptic technic

A strict adherence to this rule is true conservatism and any palliative measures will cost lives. As a matter of routine this ligation should not be carried out until the severe shock is combated

If the hemorrhage is temporarily controlled by local pressure methods for combating shock may be instituted without endangering the integrity of the limb. If it is necessary to apply a tourniquet to the limb to control the hemorrhage then it is a matter of mature surgical judgment to determine the question of sacrificing the limb to the end that life may be saved by the treatment of the shock. Assuming that it has been decided to amputate the leg the shock should be completely overcome before proceeding with the operation even if this involves the delay of several hours. The practice of doing an immediate amputation should be discouraged for this additional shock is often the determining factor in an immediate fatal termination. This is particularly true in compound fractures of the femur with extensive suppuration

In this class of cases a preliminary high ligation of the femoral artery under a local anesthetic is sometimes advisable. Severe secondary hemorrhages frequently occur in cases of compound fracture of the maxilla accompanied by deep laceration of the soft tissues of the floor of the mouth. Extensive sloughing of the tissues in this location is prone to occur because of the mixed infection and the inadequate drainage

In cases of severe secondary hemorrhage from the floor of the mouth where the loss of blood is sufficient to produce grave

constitutional evidence of shock, it is inexpedient to palliate, and an early ligation of the external carotid should be done immediately. A large stomach clamp the blades of which are protected by rubber tubing can be used to good advantage in grasping the large mass of this sloughing tissue in the floor of the mouth and thus check the hemorrhage temporarily.

Treatment of Shock.—It would be futile to attempt to discuss the various theories regarding the causes of shock at this time for it would lead us far afield. In spite of the exhaustive work that has been done on this subject since the beginning of the war, little accurate or scientific knowledge has been added to the subject. Clinical observations by Cannon, Fraser, Crile, and others have added much to a better understanding of the value of certain methods of treatment. The deductions of these investigators make it clear that the application of heat is one of the best and most potent agencies in the restoration of a normal blood pressure. The application of heat should, therefore, be employed in every case of severe shock following hemorrhage.

The question of the use of various artificial fluids to replace the loss of blood has been the subject of much investigation and serious discussion. These investigations have led to the general belief that Ringer's isotonic saline solution has little or no therapeutic value and its use may be harmful. Baylis states that "experimental evidence does not warrant much reliance being placed in hypertonic salt solutions." If bicarbonate of soda solution alone is of great value it has not been demonstrated clinically. The use of an artificial solution composed of 6 per cent gum arabic and 1.5 to 2 per cent bicarbonate of soda to prevent hemolysis and perhaps neutralize acid products has been practised extensively and very favorable results are reported. Its value is dependent upon the viscosity of this fluid which prevents its rapid dissemination into tissues. It has been noted that this solution maintains the normal blood pressure longer than any other artificial solution.

Artificial solutions are not comparable in value to the transfusion of blood in restoring and maintaining permanent normal blood-pressure after hemorrhage. Since secondary hemorrhage

nearly always occurs at the evacuation hospital or the base hospital it is possible and feasible to obtain donors at these locations and it is the one single form of treatment that should be considered. It has been found practicable to secure donors without difficulty and to have a number of them grouped and prepared for any emergency. It is customary in the British Army to give a donor a leave to England and almost any soldier is willing to furnish the necessary quantity of blood if promised a 'Blighty'. American soldiers have been more than willing to act as donors without the promise of reward and in several cases they have voluntarily offered blood to be used in transfusing British soldiers. Naturally it is necessary to determine the reaction of the recipient's blood so that transfusion may be a safe procedure. The simplest method is the one devised by Moss who found that all individuals fall into four groups as follows:

MOSS'S CLASSIFICATION

Serum of group	Cells of group				Number of individuals in group
	I	II	III	IV	
I	0	0	0	0	I = 8 per cent
II	+	0	+	0	II = 40
III	+	+	0	0	III = 12
IV	+	+	+	0	IV = 42

Group IV donors may be used in all cases with safety without the necessity of testing the recipient's blood.

Methods of Transfusion—As Robertson aptly puts it transfusion of blood should be regarded essentially as a transplantation of tissue and demands the same attention to detail that is necessary in performing such an operation. The direct method of transfusion is practically never employed in war surgery as the indirect method is much simpler and more adapted to this type of operation. There is a growing tendency to use blood modified by citrate of soda rather than the unmodified blood of the donor transferred in paraffin tubes. The former method has been advocated and generally adopted for use in the American Army. In this connection it should be noted that no matter what method is employed the greatest care should be exercised in avoiding rough handling of the blood. Shaking flowing over

rough surfaces delayed flow of blood and prolonged contact with foreign surfaces should be prevented. It is essential to preserve the integrity of the platelets in every possible way. It can be fairly maintained that the unmodified blood is preferable if the method can be simplified. The fact that this method more generally destroys the veins of the donor and the recipient has not proved a serious disadvantage in clinical experience. The two following methods of technic simplify the coating of the tubes with paraffin this is generally true of the solution of paraffin in ether which is employed as follows:

Cold Method of Coating Transfusion Tubes—Dissolve in ordinary ether hard paraffin in proportion of 1/80 to 1/20. It is not necessary to sterilize paraffin. Autoclave Kimpton tubes and after removing wash out with methylated spirit and follow with ether. Permit to dry. Pour an ounce of the ethereal solution of paraffin into the tube and after replacing rubber stopper shake well and pour excess of liquid out of the large end. After a few moments of drying the tubes are ready for use.

Hot Water Method—Sterilization of tubes—1 (a) Tubes may be boiled and used while still hot or warm in which case they must be dried outside and inside. A long dressing forceps with gauze will clean the inside sufficiently. It is not necessary to have complete drying but the drying removes sediment from the inside of the tube from the rust of articles and débris of the sterilizer which is nearly always present.

(b) Tubes may be washed dried with ether or alcohol and sterilized in autoclave. This second method gives a slightly more uniform coating of paraffin because it prevents the sterilized sediment from clinging to the sides of the tube. This sediment very often is the cause of air bubbles collecting on the paraffin coated tube surface.

2 Ordinary paraffin is heated directly on stove for sterilization. It is then set in hot water bath for use to prevent cooling or if the tubes are boiled at the same time it may be set in sterilizer and kept hot in it. No definite temperature can be stated for the water as this varies with the heat and consistency of the paraffin. A rough estimate which may be used is to have

the water about as hot as can be tolerated when poured on the forearm

Two persons with sterile gloves, gown mouth gauze, etc., are found convenient for preparing tubes. Tubes are of two types—one with two cannulae, and the other with one cannula



Fig. 1

at the bottom. The tube is covered with gauze to prevent burning the band and grasped at its center. The tube is tilted at an angle and the hot water is poured into it very gradually, bringing the tube upright until the tube is filled to a level just below the upper cannula (Fig 5), or in the case of the tube with one cannula to within 2 inches of the top. This is done to avoid

allowing air bubbles to be carried in and to cling to the sides of the tube. This occurs when the water is allowed to splash in. Bubbles collecting along the sides of the tube remain and spoil the smoothness of the paraffin coating.

The water is held in the tube by a gloved finger, covered with gauze, placed over the cannula at the top and over the one at the bottom as well. The assistant now pours the heated paraffin on to the surface of the hot water, filling the tube to level full. The hot water is now allowed to flow out at the bottom cannula, and as the surface of the water recedes more paraffin is poured in to the amount of 2 ounces. A good guide is to pour paraffin in until it reaches from the top cannula to the top of the tube.

Continue to allow the hot water to escape from the bottom cannula, noting the thickness of the coating of paraffin. This thickness can be controlled by the rapidity with which the hot water is allowed to escape from the lower cannula. When the paraffin is still a little above the top cannula, the tube should be carefully tilted away from it, so that the paraffin is allowed to flow out of the top cannula, thereby preventing its complete blocking.

There is sometimes difficulty in getting the last paraffin through the lower cannula before it hardens, thus blocking the lumen. This is obviated by placing the end of the tube into hot paraffin which is accessible in its container. Just as the last few drops are coming through the bottom cannula, the tube is quickly tilted upward allowing the paraffin to run back, otherwise it would remain in the cannula and block the opening. If the lumen remains blocked in spite of this manipulation a heated fine-pointed sterile probe can be used to obtain an opening.

The unperforated cork used in the two cannula type of tube is dipped into the paraffin and while still warm placed in the tube. The perforated cork with the glass tubes in its center may be treated in the same way. It is well to dip the entire outside of the cork and the upper end of the tube into warm paraffin after the cork is in place.

A few attempts are usually necessary to develop the technique of a smooth coating. It then becomes quite easy to judge the

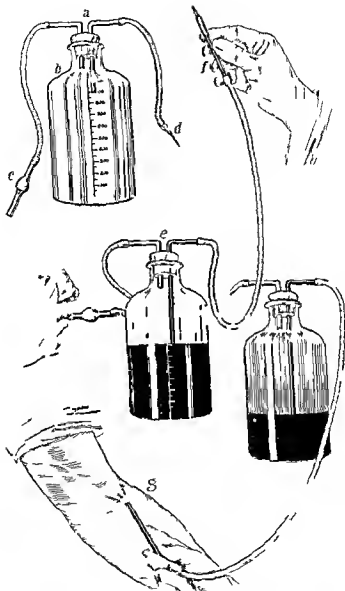


Fig. 1.—Blood transfusion. Rubber stopper with two glass tubes & liter

consistency of paraffin heat of the water and rapidity of allowing the water to run through which is necessary for a smooth coating. It has been found that ordinary paraffin works much better than mixtures containing vaselin beeswax etc. For cleansing the tube ether soap and water (hot), and later benzine have been found to be the best solvents for paraffin.

It is maintained by Lee and others that blood modified by the citrate method has no dangers and the advantage of being simpler and of not destroying the veins. Little is required in the way of apparatus. A liter bottle two rubber stoppers having two perforations and sufficient rubber and glass tubing are all the necessary essential. The attached figures and descriptions are taken from a pamphlet published by the American Red Cross in France (figs 5-6).

The value of the transfusion of blood in patient suffering from the shock accompanying secondary hemorrhage cannot be overstated. It far surpasses any other method in restoring and maintaining the normal blood pressure and should be used in every case of severe shock following a hemorrhage as a preliminary to operative procedure. The remarkable results that have been obtained through the use of transfusion of blood are far reaching and the general practice has saved many lives.

CLINICAL LECTURE BY DR VICTOR D LESPINASSE

NORTHWESTERN UNIVERSITY

BLOOD TRANSFUSION¹

Summary Difficulty encountered in blood transfusion—methods employed to obviate clotting of blood—indications for transfusion—class of cases met with in army work, methods of testing blood—technic of the Moss test, selection of donor—the ideal one, methods of direct transfusion—use of iridio-platinum tubes paraffined cylinders, indirect transfusion—cylinder citrate method, citrate method—apparatus necessary disadvantages, reactions following transfusion—transmission of disease, comments

THE whole subject of blood transfusion is rather extensive, and in the little time allotted to us I think we had best concentrate on one or two reliable workable methods. During this period I can give you the exact details of the technic of these methods and you can use them until you acquire experience, and then, if you wish, you can modify them or develop methods of your own. Blood transfusion is a matter of technic pure and simple, and the technic is a matter of detail. If you omit any one of the minor details you will have failure, whereas if you carefully observe all the minute details of technic you will have success.

The chief difficulty encountered in blood transfusion is the clotting of the blood. Circulating blood is fluid. If you can keep it fluid there will be no difficulty in removing it from one individual and putting it into another, no more difficulty than you have in giving saline solution or intravenous injections of any sort.

To obviate the clotting of the blood many methods and substances have been employed. The first to be used was the care-

¹ Given to the members of the Dental Reserve Corps, U S Army, March 15 and 22 1918

ful handling of the blood vessels while they were being sewed together. Next the Crile cannula was developed and presented to the profession. At one time this was the recognized surgical method of performing the operation of transfusion. Next tubes of various sorts such as those of glass as devised by Brewer and the indio-platinum tubes such as I developed were used and today these methods are the simplest means of performing a direct transfusion. Later the so-called indirect method with the use of multiple syringes or paraffin-coated glass cylinders was used and lastly we have the use of anticoagulants the principal one of which is sodium citrate.

Indications.—The chief indication for transfusion is acute anemia such as comes from the wounding of large blood vessels. The next indication is to supply fresh blood containing antibody and complement to enable the recipient to overcome infection. In this indication it is best to use blood which is immune to the particular infection if such a one is obtainable. An intermediate group between hemorrhage and sepsis is the group embracing purpura hemorrhagica hemorrhagic disease of the newborn, and acute infectious diseases. This group combines the two indications for transfusion namely hemorrhage and sepsis. In some of the clinical pictures in this group the predominant picture is that of sepsis and hemorrhage is in the background. In other members of this group the reverse is true. In cases where hemorrhage is the predominant clinical picture transfusion is a marvellously curative procedure. In cases where sepsis is the predominant clinical picture the results of transfusion are not so readily determinable. The class of cases that will be met with in the army are mostly of the acute hemorrhagic type from wounds although there are a large number of cases of peculiar types of sepsis which experience may show can be best cured by transfusion.

Testing of Bloods—The present method of determining the miscibility of one blood with another has resolved itself into the determination of the presence of iso-agglutinins. This classification of bloods was originally devised by Moss and it has stood the test of practical experience perfectly. He divided

individuals into four groups, calling them Groups 1, 2, 3, and 4. It was found that about 10 per cent of individuals belong to Group 1, about 7 per cent to Group 3, 40 per cent to Group 2, and 43 per cent to Group 4. To determine the individual's group it is necessary to have sera from Groups 2 and 3. If these sera are mixed with corpuscles of Groups 1, 2, 3, and 4, you will have agglutination or non agglutination as shown by the following table:

Sera	Corpuscles	Results
Groups 2 and 3 mixed with	Group 1 equals	Agglutination for both
Groups 2 and 3 mixed with	Group 2 equals	Negative for 2 and agglutination for 3
Groups 2 and 3 mixed with	Group 3 equals	Agglutination for 2 and negative for 3
Groups 2 and 3 mixed with	Group 4 equals	Negative in both

By comparing the result obtained in the test with the known standard as shown above we can determine at once the proper group to which the individual recipient belongs. If possible a donor of his same group should be selected. If no donor of this group is available we can use as a donor an individual from any group whose corpuscles are not agglutinated by the recipient's serum. The donor's serum may be disregarded in this connection as it is introduced in relatively small doses and immediately diluted by the large mass of the recipient's sera. Consequently by studying the following table we can see which individuals are suitable as donors for the recipients of the different groups. Any individual belonging to a group where there is a minus sign in the table can be used as a donor for the recipient group upon the same line.

Sera of recipient	Corpuscles of donor			
	Group 1	Group 2	Group 3	Group 4
Group 1	—	—	—	—
Group 2	+	—	+	—
Group 3	+	+	—	—
Group 4	+	+	+	—

As you see from this table, Group 1 is the universal recipient and hence any individual in Group 1 can be transfused safely

from any other individual. A recipient belonging to Group 2 can be transfused only with blood from Groups 2 or 4. A Group 3 patient can be transfused only from an individual in Groups 3 or 4, while for a Group 4 patient we must have a Group 4 donor, as none of the others are suitable. Group 4 is the universal donor because its corpuscles are agglutinated by no serum. When a donor outside of the individual's own group is used there is an increased percentage of reaction. The sera of Groups 2 and 3 can be preserved sterile in ampules or they can be dried on paper according to the method of Hartman, as published in the Journal of the American Medical Association November 16 1918 so as to have them available at all times.

Technic of the Moss Test.—To make an agglutination test we must have corpuscles and serum from the prospective recipient as well as corpuscles and serum from each of the prospective donors. The corpuscles are obtained by putting 1 to 3 drops of the blood into 1 c.c. of 1½ per cent sodium citrate solution dissolved in 0.9 per cent salt solution. The serum is obtained in the usual way by allowing the blood to clot and the serum to separate, or by putting fresh blood into a centrifuge and centrifuging it. The mixture of the blood sodium citrate and salt solution is now called 'cells.' One drop of this cell mixture is now added to 2 or 3 drops of serum from each of the prospective donors. This had best be done by using a hanging-drop slide. Next the corpuscle mixture from each of the prospective donors is mixed in the same proportion with the cells of the recipient. It is best to make two sets of slides to enable one to have a check on the results. Agglutination if it takes place comes within a few moments as a rule but the slides should be left at least an hour before final judgment is passed. When the agglutination is marked the cells are drawn together in groups. The reaction then is evident macroscopically and we have a bilocular brick-dust sediment occurring throughout the slide. If the bloods are not agglutinated on both slides that individual is suitable for a donor. If the prospective donor's serum agglutinates the recipient's cells in an emergency that in

dividual may be used because the serum injected is injected in relatively small amounts, and is immediately diluted by the large volume of serum in the recipient and, consequently, will do a minimum amount of harm

Selection of Donor—In selecting a donor after we have determined the miscibility of his blood, we should select as large an individual as possible and one with as large veins as possible. In drawing the blood from the prospective donor to determine his group or suitability for use, we should draw it from the smaller veins low down in the forearm, leaving the large trunk veins free from puncture so they can be used in the operation itself

The ideal donor is a large individual, tall and rangy, whose superficial veins of the forearm are so arranged that they all flow into one common trunk at the bend of the elbow. If this sort of an individual can be obtained any method of puncture transfusion can be carried out, as the large veins can be punctured by a large needle and 500 to 1500 c c of blood withdrawn in a very few minutes

It is also of importance in selecting a donor to choose one with as stolid a temperament as possible, so that he or she will co-operate with the operator throughout the operation, and not spoil everything by lack of co-operation at some critical moment

Technique of Direct Transfusion, Using Indio-platinum Tubes—The radial artery of the donor is dissected out under local anesthesia for about an inch. The small branches are doubly clamped and doubly ligated. As the blood is flowing through the artery its diameter is carefully measured with a millimeter gage. A heavy silk ligature is now passed beneath the artery. Traction is made upon this pulling the artery out of the wound. A blood vessel clamp is now applied to the artery in the proximal angle of the wound, and then an artery forceps is applied to the artery in the distal end of the wound, the artery is now severed just proximal to the artery forceps. Immediately the vessel is washed with *saline solution*, the adventitia is grasped in fine forceps, pulled down, and cut off flush with the vessel end (Fig 7 a and b). Next the end of the artery in the grasp of the artery

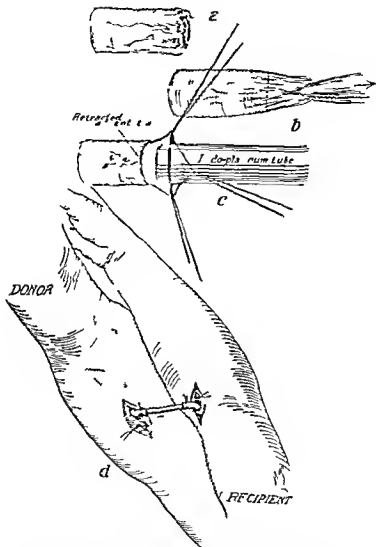
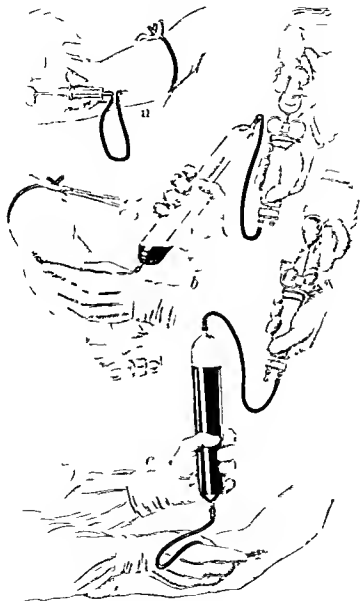


Fig 7—Direct transfusion, using audio-platinum tubes. *d* Loose ad'ventitia at severed vessel end. *b* ad'ventitia pulled down and cut. *c* vessel retracted by means of three guy sutures to permit insertion of tube. *d* transfusion in progress.

forceps is ligated. While an assistant plays a constant stream of solution in the vessel end the artery is gently stripped from the upper clamp to the cut vessel end thus removing all free blood and clots from the lumen. Three fine suture piercing all the arterial coats are now passed through the proximal end so that traction upon them will open the vessel end wide. While traction is being made on these guy ropes the iridio platinum tube is inserted into the open arterial end (Fig 7 c) and the artery gently ligated to the tube. The same technic is now carried out upon one of the superficial veins of the forearm. The clamp in the vein is removed then the clamp on the artery is removed and blood begins to flow.

Technic of Direct Transfusion by Means of Cylinders—In using the paraffined cylinders for transfusion the special point in the technic is the even coating of the inside of the cylinder with the paraffin. This is done in one of two ways either by heating the tube in the oven after placing the requisite amount of paraffin in it and then when the tube and the paraffin are warm to roll it around in such a way that the paraffin is distributed and hardens as an even coat over the entire inside of the tube. The other method is to place the paraffin in the tube and then heat the tube over a Bunsen burner gradually rolling the cylinder to see that the paraffin is distributed as evenly as possible over the inside of the tube. Great care should be exercised so that the outlet of the tube is not occluded by the melted paraffin. To my mind this method has a limited value as it comes in competition with the direct methods if it is necessary to cut and expose the vessels to use it. If you try to use this method by simply distending and puncturing the veins unless you have extremely large veins you will find that the large amount of blood necessary cannot be aspirated in the few moments before clotting occurs.

A modification of this cylinder method is known as the multiple syringe method in which we simply have a large number of 20 to 30 c.c. syringes. A syringe is filled with blood and disconnected. Then another syringe is attached and the assistant begins withdrawing the plunger thus filling the second



syringe with blood. While the assistant is filling the second syringe the first one is transferred to the needle that has already been inserted in the vein of the recipient, and the syringe discharged into the vein. As soon as discharged the first syringe is replaced by the second. This process is carried on until the required amount of blood has been transferred.

Occasionally between the syringe-fuls of blood a syringe-ful of salt solution is injected through the needle in the vein of the recipient to clear the vein and to prevent accumulation of blood cells in the needle. This method is facilitated by using the special cannula devised by Lindeman which consists of a cannula accurately fitted with a needle trocar through which one is able to aspirate the blood and thus determine definitely that he has entered the lumen of the vein.

The Cylinder Citrate Method of Indirect Transfusion—A large cylinder holding 500 c c with needle attached to one end and a suction pump attached at the other is sterilized. The inside of the cylinder is moistened with a 10 per cent citrate solution and about 10 to 20 c c of the citrate solution is allowed to remain in the cylinder. As you see this amount of citrate is insufficient to absolutely prevent clotting but it will retard clotting for several moments or for a sufficient length of time to enable us to fill and discharge the cylinder, simply by puncturing the veins in both donor and recipient.

The only point in the technic which differs from the simple sodium citrate transfusion is that the needle should be inserted into the vein of the recipient before we start to draw the blood from the donor. The assistant holds the needle in place and gradually injects salt solution in sufficient volume to keep the needle clear throughout the time necessary to fill the cylinder from the donor. Then the needle attached to the large cylinder is inserted into the vein of the donor and suction made with the pump. When the cylinder is full of blood it is removed from

the needle. The syringe is removed from the needle that has been placed into the vein of the recipient and the cylinder attached the pump reversed so that it now pushes instead of sucks the pressure is applied and the blood is injected. This to my mind is the ideal method of indirect citrate transfusion (Fig. 8).

Citrate Method —With the citrate method we have a definite means of measuring the blood. The blood is drawn into a graduated vessel and we know exactly how many cubic centimeters of blood are withdrawn. Therefore it is not so essential to watch the donor's pulse so carefully. We must know how much blood the donor is losing and we know that with this method further more we can stop drawing blood whenever we wish. An individual weighing 135 to 160 pounds can lose 500 to 800 c.c. with no danger. Where we have it coming into a vessel which we can measure we know exactly what blood the donor is losing and we can stop before any grave clinical symptoms of blood loss manifest themselves.

The strength of citrate used should be sufficient to make a 0.1 per cent. solution in the injected blood that is 0.1 c.c. of a 10 per cent. sodium citrate solution to each 10 c.c. of blood. This is the minimum amount of citrate sufficient to hold in abeyance the clotting properties of the blood and keep it fluid indefinitely. The preparation and technic summarizes down to mixing the blood with this citrate solution and then injecting it the same as you would salt solution. This then is blood transfusion in its simplest clinical form at the present time.

The apparatus necessary is a large needle or cannula, a piece of rubber tubing, a funnel or percolator and a graduated beaker or flask to catch and measure the blood while it is flowing from the vein of the donor. As the blood flows from the vein of the donor into the beaker we should be constantly adding a sufficient amount of the 10 per cent. citrate solution. This should be stirred with a sterile glass rod to mix it intimately with the blood as soon as possible. It is not wise to add the citrate in excess as something may occur to check the flow of blood and then our solution will be overcitratized.

This method has the disadvantage of not being applicable in certain pathologic types of hemorrhagic disease which you as army men will probably not meet or meet very rarely, and in causing a slightly higher percentage of blood reaction than with straight unmedicated blood. The general indications for transfusion of blood in army work would be sudden acute anemia from severe injury and severe sepsis and the citrate method is applicable to all that type of cases. The citrate is eliminated rather rapidly by the kidneys and unless you do a very massive transfusion or use a higher dose of citrate than $\frac{1}{2}$ of 1 per cent, there is very little danger of toxicity from the citrate.

Transfusion in Progress—The donor is requested to lie down upon a table baring the arm which has previously been selected because of the size of the superficial veins. A constrictor is placed around the arm sufficiently tight to obstruct the venous return but not sufficiently tight to obstruct the arterial inflow. He is told to flex and extend the fingers and when the distention of the veins is maximum a large vein is punctured with as large a needle as possible. The blood coming through the needle is caught in a beaker and intimately mixed with the sodium citrate solution. When the desired amount has been collected the constrictor is removed the needle withdrawn and pressure applied to the point of puncture. The blood is now set aside momentarily.

A small syringe filled with salt solution is attached to another needle. A constrictor is applied to the arm of the recipient, and when the veins are distended they are punctured and a few cubic centimeters of the salt solution injected as a test of the puncture. If the puncture has been successful the syringe is disconnected and a funnel or percolator attached to the needle, the blood is poured in and allowed to run into the vein of the recipient.

Reactions—Following transfusion there is frequently a temperature reaction with or without chill. Rarely do we have a chill without subsequent temperature reaction. These chills come on from a few minutes to an hour or two subsequent to the operation. At the time of the chill there is frequently a drop of temperature below normal. Subsequently the tempera-

ture rises to as high as 106° F. It maintains this peak for from one to ten hours and then drops suddenly to normal. The chill and temperature are due to the parenteral ingestion of protein. The reactions are more frequent and severe when we have used blood that is not of the same group but even when we use the same group blood a reaction cannot be absolutely prevented as any test known at the present time has a certain fallibility. Individuals who have had multiple transfusions from multiple donors are more prone to have severe reactions on subsequent transfusions than they are at first.

Examination of the urine and vomitus during these reactions will show *no blood elements no hemoglobin* and a pure protein reaction whereas in cases transfused with blood corpuscles that are agglutinated or hemolyzed by the recipient's serum a hemoglobinuria is present.

The treatment of these reactions is along general medical lines—external heat and stimulants. If the factor of anaphylaxis is prominent the use of atropin and adrenalin may give relief.

Another ill-effect in transfusion is a too rapid insertion of the blood causing a dilatation of the heart. This may come on suddenly or it may manifest itself as a blueness of the fingers, toes and lips in a half hour to an hour or even longer after operation. Evidently the heart is able to stand the strain for this length of time and then gradually decompensates. If the patient rests and is carefully treated in twelve to twenty-four hours the heart gradually compensates again. This danger is particularly liable to occur where we are dealing with chronic anemia patients and rarely occurs in young or middle-aged individuals suffering from acute anemia.

Transference of disease is liable to occur. Instances of the transference of syphilis and of malaria are recorded. An embolus may occasionally occur as manifested by sudden pain in the chest and coughing accompanied by bloody sputum signifying an embolus in the lung or by sudden sharp pain in the back subsequently followed by bloody urine indicating an embolus in the kidney. These phenomena fortunately are very rare with a careful technic.

CLINIC OF DR. CARL BECK

NORTH CHICAGO HOSPITAL

THREE CASES OF FACIAL PLASTIC

Surgical. Case I—Keloid scars on face and deformity of eyelids following burns received during an epileptic seizure—plastic operation for restoration of eyelids—results

Case II—Crushing injury to nose—stages of reconstruction operation—results

Case III—Destruction of nose following treatment for an eruption—method of constructing a new nose—lessons to be learned from this case

CASE I—PLASTIC OPERATION FOR RESTORATION OF EYELIDS

THIS little boy is fourteen years of age but rather undersized. Unfortunately he is not entirely well developed mentally, having been subject to epileptic seizures ever since he was a baby. These fits are quite severe, lasting from seven minutes to one half hour, and at times are so frequent that one follows another on an average of six or eight a day. To one of these attacks he owes his present injuries and deformities. While taken suddenly with convulsions he fell upon a burning stove, producing burns over the right eye, nose, and on the side of the left eye, besides burns of a minor degree on the extremities. After long suppuration the burns on the eyes and face healed, but with the formation of keloid scars and a deformity of the eyelids on the right side. The upper eyelid is entirely missing, and in its place is a cicatrix extending from the outer angle clear into the root of the nose. The conjunctiva bulges out in this place, and in trying to close the eye the protruding conjunctiva is drawn down, not quite to the middle line. The lower eyelid is also burned out and forms what we call an ectropion (Fig. 9). The scar above the nose is keloid, and so is the one on the outer angle of the left eyelid, but they do not interfere with the motion of the eyes. Owing to the ectropion the tears constantly run down the face and

keep it eczematous. There exists therefore a double indication to restore the eyelids, a functional and a cosmetic one. There is no eyebrow to speak of present on the right side. There is, therefore, a partial indication if possible to restore the eyebrow.

The cure of this deformity consists in the performance of a plastic operation. As the case is a very complicated one and a large number of scars already disfigure the face, the details of the operation must be well thought out before attempting res-



FIG. 9 Photograph of Case 1

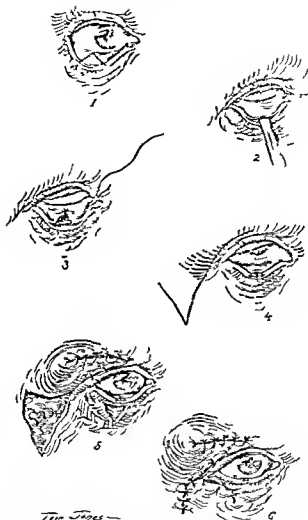
toration. The skin on the forehead and on the cheek seems to be the most available material for operation. The plan is to use a double flap with one single pedicle if possible to restore the upper and lower eyelids from the outside and a frontal flap to supply the inner angle of the upper lid. To take a flap which would restore the whole eyelid in one piece would endanger this flap in its circulation inasmuch as the largest portion of it has to be the one most distant from the pedicle.

The operation of restoration of the eyelids in this case consists of the following acts. First the scar is dissected from the

upper eyelid Fortunately the border of the lid is not destroyed but a part of the tarsus is so that the eyelid has not the natural configuration of a cover of the eyeball with the convexity outward as it ought to have Some portions of the muscles are also gone and what are left are atrophied The lower lid is also freed of cicatrices by resecting accurately the scars from the portion below the same and after it is made movable the upper and lower eyelids are brought together and sutured by three stitches over the eyeball At this time we can see exactly the extent of the defect which we have to cover We now form a large flap with two prongs somewhat in the shape of the claw of a lobster the larger one to cover the upper lid and the smaller one to form the cover of the lower one They are taken from the temple where the skin is pliable and enough resistant to stand a twist of 45 degrees The outer border of this skin is taken from the borderline of the hair and some of the hair is taken along to form the eyebrow When we twist the flap into its shape we find that the extremity over the upper eyelid covers about two thirds of the defect so that about one third in the region of the nasal root remains to be covered from the forehead Here also a flap is taken vertically from the forehead and turned into the horizontal defect and sutured on to the flap from the outside The defects on the temple and on the cheek are diminished by close approximation of the wound borders as far as possible and whatever cannot be drawn together is left to granulate

The result of this first operation was beyond our expectation Primary union took place in almost every line of incision and shortly after the operation the patient was able to close the eye without difficulty For six months the result has been the same even improving to a certain extent except that the lower eyelid is gradually turning into a slight ectropion but not as bad as before operation There is also a disagreeable fold corresponding to the outer angle of the eye on that place where the upper and lower flaps have met The tears make this place somewhat eczematous causing a constant irritation

It is therefore deemed advisable to do a second operation particularly since the upper lid could stand somewhat of an en



TEIN JAMES

Fig 10—1 Triangular cut, line of ectropion, and lines of incision. 2 Separation of conjunctiva corresponding to triangle outlined in 1. 3 Excision and suture of triangle. 4. Outline of flap to raise the depressed border of the outer portion of the upper lid. 5. Flap is turned 90 degrees and sutured to upper border. 6. Suture of the defect in the flap.

largement on its outer surface. The overlapping fold is cut down into the shape of a flap and this flap is turned upward. A triangular piece of the conjunctiva with its base on the margin of the eyelid is cut out and the eyelid is drawn to the side, far enough to join the side of the defect caused by the flap. This does away with the ectropion by means of an old well known method of ectropion plastic, called by the name of its author, the Kuhnt method. The flap of the fold is inserted into the upper eyelid and makes an admirable effect.

The result is almost perfect. The eye can be closed perfectly and with ease, the upper eyelid is movable, and the eye brows have grown, only the hair must be clipped occasionally, as it becomes too long and too straight.

CASE II—RECONSTRUCTION OF AN INJURED NOSE

This patient is thirty five years of age. In 1918, while sawing lumber a slash hit him on the nose, tearing the nose, face and left eye. A doctor sewed it up immediately and the wound healed in about two weeks but left the nose in a crushed condition tilted up with the eyelid everted, and scars running through the area. On the inner corner of the right eye is a fistula which discharges continually. The right and left sides of the nose are completely occluded.

In this condition the patient was referred to Dr. Joseph Beck who on June 10th under local anesthesia broke up the atresia of the nostrils, dissected the skin over the septum from the frontal bone and inserted two pieces of cartilage which he had resected from the eighth rib, into the cavity holding them in position by quilting sutures passed through the nose near the junction of the frontal bone. Into the nose he put splints.

Following the operation the patient who was a rather weak individual developed high temperature, with a great deal of irritation and suppuration on the right side of the chest from which the cartilages had been removed. This suppuration and temperature persisted until (on June 29th) a sequestrum was removed from the bridge of the nose. The chest wound discharged for some time but was treated with success.

On July 29th the condition of the nose was about the same as when he arrived for treatment. The fistula in the right side of



The Times

Fig 11—1 Edges of flap at base approximated to diminish bloody surface and facilitate circulation. 2 Flap is sutured into the freshened surface of the bridge of the nose on three sides.

the bridge of the nose continued to discharge, and when he forced air into the nose and closed the nostrils the air came out

through the fistula, showing a communication with the nasal cavity. He was referred to our clinic on August 16th, and on



Tom Jones

Fig 12—3 Flap has adhered to its new base. The probe indicates the space left between the bridge of the nose and the pedicle. 4 The free side of the flap is sutured into the freshened bridge and the balance of the pedicle is spread out. The borders of the defect are freshened to ensure a covering for the defect.

September 1st a new plastic of the nose was made under ether anesthesia.

On July 29th the condition of the nose was about the same as when he arrived for treatment. The fistula in the right side of



Tom Vasez

Fig 11—1 Edges of flap at base approximated to diminish bloody surface and facilitate circulation. 2 Flap is sutured into the freshened surface of the bridge of the nose on three sides.

the bridge of the nose continued to discharge, and when he forced air into the nose and closed the nostrils the air came out

of the nose but would also keep the root and tip as far apart as possible thus securing a straight instead of a saddle nose. Then the flap was sutured into the defect.

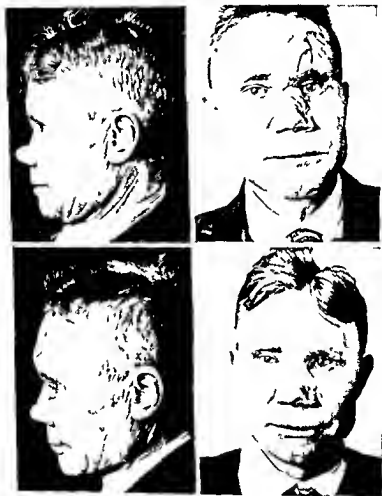


Fig. 14—Photographs of Case II

The patient made an absolutely good recovery with primary union of the wound. Two weeks later the bridge of the flap was

First, the entire scar over the bridge of the nose was resected, leaving a quadrangular defect. Two sides of the quadrangle ran longitudinally on the side of the nose, the other two sides were at the root and at the tip, running transversely. This quadrangle was cleared of every vestige of scar. Where the fistula communicated with the nose the tract was dissected. Then a tongue-shaped flap was dissected over the left eye, running directly upward and outward with its pedicle directly over the

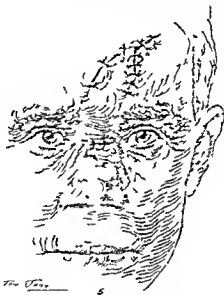


Fig 13—Flap sutured into place

artery. This flap was turned down and fitted with the three sides into the quadrangle of the wound. Before it was stitched, however, a piece of bone cut in the shape of a cylinder with two sharp points at the ends was removed from the right tibia and inserted into the defect. A hole was tunneled into the bridge part of the defect and another into the tip part of the nose to receive the points of the bone. It was measured, so that when it was put into those holes it would not only form a bridge

CASE III.—CONSTRUCTING A NEW NOSE

Mr E P, twenty one years old with a very interesting history of sickness from his early childhood. The mother died from some sort of throat trouble. When he was about one year old he had some kind of "breaking out" on his nose. He was taken to St. Louis for treatment where the doctor used some very strong medicine which destroyed his nose.

The condition at this time when he was referred to my brother, Dr. Joseph Beck, for treatment was about as follows. The nose was missing from about an inch below the root and all the soft parts were gone and replaced by scars which drew the upper lip upward so that his mouth could not be closed. The nostrils were entirely gone and the communication between the outer and inner nose entirely suspended. Instead of the prominence there was a deep recess in the side view of the head, which demonstrated particularly the condition as it existed in the first operation.

On May 10 1917, Dr. Joseph Beck made a first attempt at plastic. He loosened the skin around the edge of the scar, turned it upon itself with catgut sutures thus forming the alæ or wings of the future nose. On May 21st under general anesthesia he made the second stage of the plastic pulling down the remains of the columella and loosened the premaxillary spine. The left arm was then prepared and the skin and superficial fascia were loosened in the elbow region the arm drawn across the face and the loosened flaps sutured to the median part of the dissected wings of the nose. A plastic on the eyebrow was also done at this time. The patient was put in a plaster of Paris cast.

On May 31st the transplant was severed and sutured with three catgut stitches but the graft over the eyebrow was necrotic. On June 2d a portion of the graft necrosed. There was some improvement in the condition but the ultimate result was not very satisfactory.

On July 12th a third attempt was made. A V shaped incision was made in the frontal region, the skin and subcutaneous

cut right at the root of the nose the superfluous part of the flap drawn upward and backward into the diminished defect of the forehead which by this time was granulating nicely and sutured exactly into its former position thus securing an intact forehead with only a few scars. The fourth line of the defect was now sutured closely into the cut side of the flap. It was somewhat bulky because it was much broader than it had to be but this larger flap was made use of at a subsequent operation with great advantage in the treatment of the ectropion.

On September 14th under local anesthesia this last operation was performed. October 1st a new attempt was made to improve the condition. This time the ectropion was attacked. The cause of the ectropion was a scar corresponding to the lacrimal duct and gland drawing the angle of the lid downward and exposing the conjunctiva. The operation consisted first in the removal of the scar tissue which left a more or less oval defect of about $\frac{1}{2}$ inch in width and $\frac{1}{4}$ inch in length below the inner canthus of the eye. Great care was exercised to avoid cutting into the lacrimal gland. Since there was a bridge of healthy tissue alongside the flap in the nose a part of this tissue had to be sacrificed in order to make use of the base of the Italian flap to cover the defect of the eyelid. A right angled flap was cut loose and dissected on three sides from the nasal bridge and inserted into the defect of the eyelid on three sides leaving the fourth side to a secondary operation.

Primary union took place and the result of this operation is very satisfactory. The present condition of the patient is such that only a few small improvements have to be made namely. Wherever the flap of the nose joins the nasal skin there is a scar which is somewhat retracted. It will be necessary to dissect this scar in order to make a better and more accurate union so that the lines of implantation of the flap are less marked. This will be done by the process of scar elimination. The other improvement necessary is to accurately join the lower eyelid to the flap taken from the nose.



Fig 15—Photographs of Case III

tissue dissected loose from the nasal bone and the old scar and new graft loosened. A piece of bone was removed from the tibia and inserted into the nose in order to make a bridge. While the graft healed the nose did not look satisfactory and on August 6th another attempt was made to slide the nose downward but it was a failure. On September 10th under general anesthesia another Italian plastic was performed to secure parts for the formation of a lip. This was partly successful but the appearance at first was quite clumsy. The nose itself did not have any prominence consequently another desperate attempt was made to produce a nose which would project more. On November 14th an Italian plastic was performed using the little finger of the right hand to implant into the nose and holding it in position with a bronze wire. The hand was held in position by a plaster-of Paris cast but unfortunately the finger did not heal in and had to be removed. On December 8th the patient developed a severe case of erysipelas which lasted for about a week and from which he fully recovered.

January 14 1918 the patient was given a morphin-scopolamin anesthesia and another attempt made to insert a finger into a pocket in the nose holding it there by silver wire and adhesive plaster. This time the finger healed in and by January 24th was well anchored. The finger was now amputated in the middle of the second phalanx and held in position by three silk sutures. On January 31st while the finger was fairly attached some parts of it had become necrotic. On February 26th under morphin scopolamin anesthesia a new attempt was made to make better use of the finger tip. A place was made under the upper lip and the bone of the finger anchored to the bone of the maxilla with silkworm gut which made a projecting septum. On March 26th the finger region was again exposed under morphin scopolamin anesthesia and it was found that a portion of the transplant was projecting sharply. Now for the first time an attempt was made to punch out holes into the inner nose and connect the external nose with the internal passing two rubber tubes through the same. In this condition after a few more attempts were made to improve the general appearance

reunite the borders of the breach made by the removal of the flap

The patient made an uneventful recovery and everything healed by primary union. Fourteen days later the flap was cut off at its pedicle and the unused part of that pedicle was reimplanted accurately into its former position covering the whole forehead now without difficulty and leaving no granulating surface. The nose looked beautiful only it had no wings and no well formed nostrils and it was very large and bulky at the root and very flat at the tip.

The next step was to form wings. With some difficulty two flaps were obtained in the region of the nasolabial fold formed like two claws running down toward the angle of the mouth. The wings of the nose dissected from the depth and covered by turning these two flaps toward the septum uniting them in the center. Thus two very nice wings were formed and the patient's appearance considerably improved. The two nostrils are patent and the tubes running to the inner nose are in position and wide enough to allow fair breathing.

What remains to be done now is the diminishing of the root of the nose by excising a part of the superfluous tissue at the same time implanting some cartilage into the tip to give it more prominence. The patient insists that he should have an eye brow if possible. I shall therefore make an attempt to implant a border of the hairy portion of the scalp as I have done before with success after removing the scar of the eyehrow. This operation is really a very satisfactory one.

This last case teaches us that the difficulties of a plastic operation which appear sometimes insurmountable may be overcome by persistence which is often harder to obtain on the part of the patient than on the part of the doctor.

the patient was left in charge of Dr. Carl Beck when Dr. Joseph Beck left for France.

To describe the condition in a few words, I would say we have a nose which looks like a diminutive organ with two openings into the inner nose kept open with some difficulty through which the patient can breathe for the first time in his life. There are no wings, no tip, and the upper lip is somewhat protruding. The eyebrow on the right side is missing and a scar is in its place. The whole region around the nose and on the forehead is scarred, but fortunately there is only a mild degree of keloid formation. There is not much projection of the nose. It is flat but no longer receding thanks to the implantation of tibial bone and finger. The finger seems to be acting very well as a septum and a good support.

I formed the following plan. The external nose will be used to make the internal lining and the new flap must be planted on it from the outside. The best place seems to me from the right forehead but with its pedicle and its nutrition from the left side over the eye so that the largest portion of the flap runs transversely across the forehead, the only area of healthy skin left on the same. At first I thought of making a sort of arm of this flap implanted into the eyebrow while the main flap would cover the nose but I changed my mind and omitted this procedure.

On September 12th I performed the operation with the assistance of Dr. H. Pollock and Dr. Gardner. Under morphine-scopolamine anesthesia the first step was to cut the bridge transversely then to cut on each side of the nose as far as possible within healthy tissue two incisions clear down into the region of the nasolabial fold. Thus right angular flap was dissected downward as far as possible and folded on itself in front to make a tip. The bridge was tunneled somewhat and into the tip was inserted a piece of bone 2½ inches in length taken from the tibia. There remained now a defect of a trapezoid form to be covered with the flap from the forehead. This was done and the forehead sutured as far as possible to diminish the defect by making a plastic sliding operation on the right extremity in order to

CLINIC OF DR. FRANK EDWARD SIMPSON

COOK COUNTY HOSPITAL

RADIUM IN MALIGNANT DISEASE. DEMONSTRATION OF 3 PATIENTS TREATED WITH RADIUM

Summary Case I—A case of epithelioma involving the base of the tongue (left side), the median glosso-epiglottic fold and the left vallecula, macro- and microscopic diagnosis, insertion of three radium needles into the growth, clinical recovery

Case II—A case of carcinoma of the left lateral surface of the tongue, insertion of radium needles into the growth clinical recovery six months later metastasis to the submaxillary and submental glands of the neck, insertion of radium needles into the glands underneath the jaw combined with powerful surface application clinical recovery

Case III—Epithelioma of the left lower eyelid nose, cheek, and upper lip, clinical recovery under radium treatment

CASE I.—CANCER OF BASE OF TONGUE AND EPIGLOTTIS

I TAKE particular pleasure in presenting this patient, now in perfect health clinically, because he represents a class of cases that were hopeless from every point of view prior to the advent of radium. It must not be supposed that success is invariable or even common in the majority of cases of this type. A successful outcome in cancer of the epiglottis is unusual, partly on account of the fact that the diagnosis is usually made late in the disease. In this case the original diagnosis of epithelioma was made from macroscopic inspection with a laryngeal mirror by Dr. J. Gordon Wilson. In order to obviate any doubt Dr. Wilson snipped off a minute piece of the growth for microscopic examination, thus confirming the diagnosis. The patient was then

married thirty two years and his children are healthy

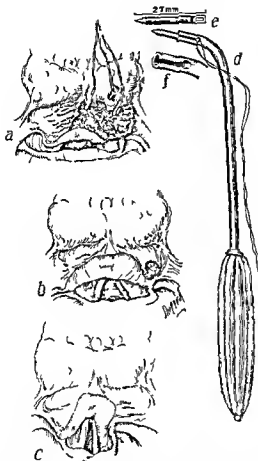


Fig 16—*a* Drawing showing epiglottitis involving the base of the tongue epiglottis and left vallecula. Three radium needles are seen buried in the epiglottitis. This drawing was made June 13 1917. *b* Drawing showing effect of the radium. A small round ulceration in the left vallecula is seen. A perforation is seen in the epiglottis. This drawing was made August 28 1917. *c* Drawing showing complete healing of the epiglottitis. The ulcer of the vallecula and the perforation of the epiglottis have disappeared. The epiglottis is drawn slightly to the left probably by caustical retraction (December 7 1917). *d* Radium needle introducer with threaded needle in place. *e* Detail of radium needle. *f* Detail of needle introducer.

Previous Illness—Childhood diseases only Syphilis denied.

Family History—No history of cancer or tuberculosis.

Present Illness—Several months ago he noticed a little sore throat on swallowing He felt as if something had stuck in his throat There is no pain now but he states that his tongue feels thick His general health is good

Examination (June 13 1917)—Ordinary inspection showed nothing abnormal about the tongue and mouth There were no enlarged glands to be felt in the neck

Examination of the Larynx (Dr Otto T Freer)—An ulcerated area was seen involving the base of the tongue the left vallecula and the median glosso-epiglottic fold (Fig 16 a)

While it would have been possible to apply a powerful radium tube to the interior of the throat allowing it to rest in contact with the growth it was thought best to attempt the introduction of my radium needles directly into the epithelioma. This was finally accomplished by means of indirect illumination under local anesthesia by Dr Freer Considerable difficulty was experienced in the introduction of the needles owing to the lack at that time of a proper instrument to hold the needle while introducing it. It was finally accomplished by using an ordinary needle-holder We may digress for a moment to exhibit the present needle introducer and the radium needles

The introducer (Fig 16 d) was devised by Dr Freer and I have added to his model a lateral slot which allows of the easy disentanglement of the silk thread which is carried by the needle The radium needles (Fig 16 e) which I now exhibit are of steel 27 mm long and 1.75 mm in diameter straight and round The wall thickness is 0.35 mm They are first gold plated and then platinum plated These particular dimensions and form were chosen for the needles for special reasons The needle is round instead of bayonet shaped so that it will if possible slip through the tissues and between the cells of the growth without cutting them This I believe is less likely to lead to metastasis than would the use of three-cornered needles The wall thickness of 0.35 mm was chosen because along with sufficient stability this steel wall cuts off the alpha and softer beta

At the present time (December 1918) the patient still remains well

CASE II—CANCER OF THE TONGUE

This case is unusual from every point of view. Cancer of the tongue is the *bête noir* of the surgeon and physician. Untreated it always terminates fatally in from twelve to eighteen months while either under surgery or radium the outlook is not promising except in its incipiency. I have seen cancer of the tongue subside a number of times in striking fashion under radium only to appear in the glands of the neck and progress sooner or later to a fatal termination in the majority of cases. A common and disastrous mistake is for cancer of the tongue to be mistaken for syphilis (gumma) especially if there is a history of syphilis. I have many times seen such a patient treated for syphilis and the diagnosis and treatment persisted in for months in spite of the fact that the patient was steadily getting worse. It is well to remember that syphilitic patients are prone to cancer of the tongue and that a positive Wassermann reaction does not exclude cancer as a patient frequently may have both diseases. If a patient is treated vigorously by antisyphilitic remedies for even a few days and the suspected tongue lesion does not yield rapidly cancer should at once be thought of and surgery or if inoperable radium should be invoked. The clinical diagnosis is usually not difficult and rests on the following points:

While the cancerous ulcer is usually single and at the border of the tongue and the syphilitic ulcer is often multiple and on the dorsum the character of the *edge of the ulcer* is the most important single point. In cancer the edge is most frequently raised, nodular and hard while in the syphilitic ulcer the edge is usually undermined and seldom or never so deeply indurated.

I may also refer to the fact that the lymphatic glands of the neck are almost never involved in gummatous ulcer of the tongue and almost invariably involved in cancer that has existed for several months. The diagnosis however ought never to be held in abeyance until enlargement of the glands

radium rays The rays bombarding the tissues are, therefore, not too cauterizing while the lethal dose to the tumor cells can be delivered in a shorter time than if the wall were thicker or composed, for instance, of platinum One is thus enabled to deliver the proper dose in a reasonable length of time—not more than twelve hours Each of these needles contains slightly more than 12 mg of radium element, but it would be possible to put in slightly more radium or, of course, less The radium salt (sulphate) is packed directly into the lumen of the needle, and the screw cap which contains the eye of the needle is then soldered on After some experience with different strengths, the 12 mg needles seem to be of a strength most generally useful

Returning to our patient, the needles were left in position in the epithelioma (Fig 16, *a*) for eight hours, and were then extracted

On August 11, 1917, a marked change was seen in the growth At the site of the epithelioma there was a round depressed, sharply outlined ulcer with a white base The left pharyngo-epiglottic fold was red and swollen Although nearly two months had elapsed since the radium treatment, it was thought possibly that the appearances were due to radium reaction, and further treatment was not given.

August 28, 1917, examination showed the appearance seen in Fig 16, *b* A small round ulceration in the left vallecula was apparent, while the epiglottis disclosed a perforation. A white exudate (probably radium effect) covered the floor of each ulcer The surface of the epiglottis was smooth. The sub-maxillary and cervical glands were not palpable The patient complained of a good deal of pain in the throat

On December 7, 1917, examination showed that complete healing had occurred The radium exudate was gone and the ulcer of the vallecula and the perforation of the epiglottis had completely disappeared The epiglottis was drawn slightly over to the left, evidently by the retraction of the cicatrix (Fig 16, *c*) Pain had disappeared and speech and deglutition were normal The patient had gained 35 pounds in weight

On June 27 1917 I decided to insert the radium needles again in the tongue. Under gas anesthesia six needles (12 mg each) were inserted and left for twelve hours.

On September 28 1917 the site of the epithelioma was depressed and a radiating slightly puckered scar was left (fig 17 b). No gross metastases had appeared in the neck or elsewhere. The subsequent history of this case is interesting.

On January 3 1918 about three months after apparent recovery from the tongue lesion the patient appeared with evident metastatic trouble in the left submaxillary and submental glands which had enlarged rather rapidly to the size of



Fig 1 —a Carcinoma of left side of tongue May 1 1917 b Puckered scar occupying site of former carcinoma September 28 1917

an English walnut. On the same day I inserted under local anesthesia five radium needles (12 mg. each) into the submaxillary mass. The needles were removed in five hours. On the day following 200 mg. of radium were used over the submaxillary and submental glands for sixteen hours. In six weeks the glands had shrunk to a small and indistinct mass hardly to be distinguished from the surrounding tissues.

The disease has remained quiescent to the present time (December 1918) and to all appearances the patient is well although I have thought it wise to give in the last few months a few prophylactic raditions over the neck. In the last six

appear as this means usually a hopeless outcome. Although the final diagnosis must rest on the microscope the best surgical opinion is against the excision of a piece of the growth for microscopic diagnosis on account of the danger of opening up an avenue for the spreading of the growth through the lymphatics or blood vessels.

History—The patient presented today is a man aged fifty three

Previous Illness—Has always been well. Syphilis denied.

Family History—There is no history of syphilis cancer or tuberculosis.

Present Illness—This patient was referred to me by Dr F N Gaggan on May 1 1917. He had noticed a sore spot on the left side of the tongue a month or two previously. He was a heavy smoker and opposite the sore spot was the stub of a tooth.

Examination showed the appearances seen in Fig 17 a. The lesion of the tongue was the size of a nickel elevated about 5 mm above the general surface of the tongue red circumscribed slightly ulcerated with hard and deeply infiltrated edges. There was no adenopathy to be made out in the adjacent glands of the neck. Operative removal of the tongue lesion was absolutely declined by the patient. On May 2 1917 under gas anesthesia, I inserted 5 radium needles each containing 12 mg of radium element into the borders of the growth. The needles were left in thirteen and one-half hours. A sharp reaction followed.

On May 18 1917 a loose piece of dead tissue (radium slough) nearly the size of the epithelioma was removed from the tongue.

On June 14 1917 the patient received fifteen hours treatment with 125 mg radium element (2 mm lead 6 mm. non metallic screen) applied externally below the angle of the left lower jaw along the anterior border of the sternomastoid muscle. At this point you will recall lie the upper deep cervical glands which are by far the most commonly affected in cancer of the tongue. This treatment was given with the hope of affecting possible metastasis to the glands of this region.

On June 27 1917 I decided to insert the radium needles again in the tongue. Under gas anesthesia six needles (12 mg each) were inserted and left for twelve hours.

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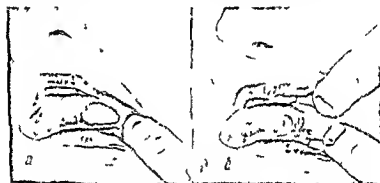


Fig 17—*a* Carcinoma of left side of tongue May 1 1917 *b* puckered depressed scar occupying site of former carcinoma September 28 1917

an English walnut. On the same day I inserted under local anesthesia five radium needles (12 mg each) into the submaxillary mass. The needles were removed in five hours. On the day following 200 mg of radium were used over the submaxillary and submental glands for sixteen hours. In six weeks the glands had shrunk to a small and indistinct mass hardly to be distinguished from the surrounding tissues.

The disease has remained quiescent to the present time (December 1918) and to all appearances the patient is well although I have thought it wise to give in the last few months a few prophylactic radiations over the neck. In the last six

months the patient has gained 18 pounds. The appearance of the tongue has not changed for over a year and the neck is normal to palpation.

In commenting on this case it must be emphasized that no claim is made as to the permanence or even completeness of this patient's recovery.

Cancer of the tongue is always of the squamous-celled type. It is the most likely of all cancers to invade the lymphatic glands early and widely and this in itself precludes success in most cases. Early diagnosis insures an increased hope of recovery. The case shown here today simply illustrates the palliative value of radium in certain cases that are for any reason inoperable.

CASE III—EPITHELIOMA OF THE FACE

This patient illustrates the great value of radium in very extensive basal-celled epitheliomas of the face. This type of epithelioma is of very slow growth, the one presented here today having been present for more than six years. I have repeatedly seen epitheliomas of more than ten years' duration which were strictly confined to a circumscribed area in the skin.

The clinical diagnosis of epithelioma of the skin is usually not difficult. The patient is (usually but by no means always past forty) the beginning as a small scurvy spot, a wartlike excrescence or minute nodule which itches slightly and tends after a time to scab, crack and bleed. All these are suggestive of cancer. Later distinct ulceration is present and the border of the ulcer almost invariably shows a peculiar raised and hard edge.

Once the clinical diagnosis of epithelioma is established it is of considerable importance from the standpoint of treatment to determine the pathologic type of cancer, especially as to whether the growth is of basal-celled or squamous-celled type. Unfortunately there is no certain method of distinguishing the two except by microscopic examination. A probable diagnosis of the type can usually be made clinically, however, and rests on the following points:

First. Its location. Epitheliomas of the face especially

when on the upper two thirds of the face and away from the mucous membrane are usually of the basal celled type. This type is also common on the shoulders and upper part of the trunk. Fully one half of the epitheliomas of the upper lip are also of the basal celled type.

Epitheliomas of the tongue, lower lip, penis and extremities are commonly of the squamous celled type. There is no absolute rule, however, holding in all cases.

Second. A papillomatous aspect to the growth usually means a squamous celled cancer.

Third. The rate of growth. Basal celled cancer grows slowly and the existence for several years of an epithelioma on the upper half of the face not larger than a silver dollar and away from the mucous membranes means almost certainly a basal celled cancer. Squamous celled cancers grow more rapidly and may attain considerable size in a few months.

Fourth. The presence or absence of metastases. Basal celled epitheliomas are said never to metastasize and if one apparently does invade the lymphatic glands late in the disease it is because a squamous celled growth complicates it.

Squamous celled cancer metastasizes early—often within a few months of the onset. It is very regrettable that so many cases appear with metastases already present. While this clinches the diagnosis it adds immeasurably to the gravity of the prognosis.

The problem of treatment hinges largely on the type of growth that is present.

(a) With *squamous celled cancer* if the case is considered operable by the conservative surgeon the draining lymphatic glands and growth should be excised en bloc. With an early diagnosis permanent recovery should be brought about in 95 per cent of the cases. If in addition to operation post operative prophylactic radiations with radium can be carried out it seems probable that even a higher percentage of freedom from recurrence can be secured.

With inoperable cases the growth may be held in abeyance at times for a considerable period and it is even possible to bring about clinical recovery in some cases by means of radium.

(b) For dealing with *basal celled epithelioma* radium properly applied is perhaps the most satisfactory agent we possess and sometimes succeeds when everything else has failed.

Recovery is usually prompt under radium, while the cosmetic result is often very excellent especially when too great destruction has not already been caused by the cancer itself.

History—The patient whom I now show is a woman aged fifty. She was referred to me through the kindness of Dr. N. W. Abell.



FIG. 18—*a* Epithelioma of the left lower eyelid, nose, cheek, and upper lip. Photograph taken June 1, 1918. *b* showing healed epithelioma. Photograph taken August 15, 1918.

Previous Illness—Has always been well.

Family History—Nothing of importance appears in the history. There is no history of cancer.

Present Illness—The growth which we see in this patient's face began about six years ago as a small spot (senile keratosis) on the left side of the nose. Very slowly the disease spread and with various periods of crusting, ulceration, and bleeding finally

assumed the form seen in the photograph (Fig 18 a) which was taken June 15 1918

The method of treatment carried out in this patient shows the powerful selective action possessed by radium especially when an almost pure gamma ray is used In the technic of treatment it is important to protect the eyes and hair In this case the eye was shielded by a special gold screen 8 mm thick The eyebrow was protected by 4 mm of lead Another point of the greatest importance in the treatment of these cases is to have at one's command a sufficient quantity of radium

In this case 200 mg of radium element screened with 1 mm of silver and 4 mm of non metallic substances (rubber and wood) were applied to the epithelioma so that an even distribution of the radium rays was obtained over the entire growth Between June 15th and August 6 1918 a total of twenty five hours was given in seances of one and one-half to three and one half hours each In the course of eight weeks the epithelioma completely disappeared without the appearance of any inflammatory reaction and on August 15th this photograph (Fig 18 b) was taken showing the complete healing of the growth

The patient appears now (December 1918) entirely well and we may confidently predict that a recurrence is very unlikely



CLINIC OF DR ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

OBSTRUCTION OF THE ILEUM DUE TO TUBERCULOUS ULCERATIONS

Summary Chronic intestinal obstruction of insidious onset probable diagnosis
x ray findings operation—pathologic condition—technic employed discussion
of ileocecal tuberculosis

December 10, 1918

THE case which I shall first operate on this morning is a patient of Dr Bertram W Sippy Dr Sippy has had him under observation for some days and has made a diagnosis of an obstruction probably in the lower portion of the ileum The patient has until the last few months had very good health There has been no history of any previous abdominal lesion of any kind Gradually without any acute symptoms there has developed a condition of chronic obstruction with very visible peristalsis without any constitutional evidences of infection as shown by increased temperature There has been some loss in weight When Dr Sippy first saw the case he was inclined to regard the marked peristalsis and distention as due to either an obstruction in the large bowel or possibly an obstruction at the pylorus Both of these however, were ruled out by careful x-ray examination The barium meal taken into the stomach showed a normal stomach and a normal duodenal cap and the barium injections into the colon showed a normal condition of the entire large bowel Some hours after the barium meal was introduced into the stomach the patient was given another x ray examination and a very marked dilatation of the small intestine was found and from the location and greatly distended loops was probably in the lower ileum The clinical diagnosis, therefore is obstruction in the lower portion of the small intestine from some unknown cause

The patient is now anesthetized and I shall make a large muscle splitting incision such as we make for an appendix lesion. I have employed this type of incision a good many times in cases that I have operated on for obstruction in the ileum and in the cecum. On opening the peritoneal cavity I find first a normal cecum coming into view. The appendix is also normal, but alongside of this cecum we can see this very greatly distended loop of ileum expanded to a size considerably greater than that of the large intestine. Drawing out this distended loop I find about 16 or 18 inches from the ileocecal valve a definite lesion in the ileum a constriction of the gut at this point which seems to be quite complete. This constriction is covered with edematous lymph and on the surface are nodules that are consistent with being the tubercles characteristic of tuberculosis. It is evident that this lesion involves the entire thickness of the intestinal wall and that it produces a very distinct and almost complete obstruction at this point. It is possible that there may be other similar lesions as my experience has been that in these tuberculous lesions involving the ileum they are apt to be multiple and on this account I shall examine carefully the entire ileum. Drawing out more of the ileum I find 8 or 10 inches from the first lesion a second lesion of the same type and continuing my search I find a third lesion. You will see that I have now drawn out 6 or 8 feet of the small intestine and that the three lesions found occupy a space of about 25 to 30 inches. It will be necessary therefore for me to resect that portion of the bowel including these three distinct tuberculous strictures. We could of course sidetrack this loop by an anastomosis but such a procedure would be I am sure not advisable because our experience has been in these cases of intestinal tuberculosis that the sidetracking operations have not been very satisfactory and I would not consider it in this case at all, because the patient is in very good general condition and I think, will safely stand the radical operation of resection. I shall make here not an end-to-end anastomosis but a side-to-side anastomosis and I will ask you to follow the technic which we shall employ.

I shall place at a distance of about 3 inches from the lesion

nearest the cecum a heavy crushing forceps on the ileum I leave this on for a few moments and then ligate with a strong silk ligature at the point of crushing of the bowel I do the same thing about 3 inches proximal to the proximal lesion in the ileum (Fig 19 a b) I shall then ligate the mesentery of this involved loop with ligatures of catgut I now place the clamp about an inch from the point of ligation and divide the bowel close to the ligature leaving simply enough of the stump to keep the ligature well in place I now by dividing the mesentery and dividing the bowel at the other end remove the entire loop including these three lesions in one piece I shall now invaginate the stump of each end of the ileum with purse string sutures I employ linen for this purpose and you will notice that I invaginate a considerable amount of the end of the ileum probably $\frac{3}{4}$ inch in the first purse string and in the second purse string suture probably $\frac{1}{2}$ inch (Fig 19 c) This makes a very complete closure of each end of the bowel I then make a lateral anastomosis just as we would in a gastro enterostomy employing three layers of suture one for the mucosa one for the muscularis and peritoneum and finally a Lembert (Fig 19 d) I now close with fine catgut the irregular opening in the mesentery so as to prevent any possible internal strangulation by a loop of intestine falling in between the intestine and this mesenteric opening This side to side anastomosis is rather time consuming At the same time in my own work and from the experience in other clinics I think it is much safer than an end to-end anastomosis in a case of this kind I believe that that is true in making an anastomosis of the small intestine and it is certainly true in an anastomosis of the large intestine where an end to-end anastomosis is extremely difficult I shall close the external wound leaving in a small cigarette drain down to the point of anastomosis This we shall remove if everything is satisfactory at the end of forty-eight to seventy two hours

In regard to the after management of the case I think it would be well to give the patient a moderate amount of fluid per rectum for several days say about 8 ounces every three hours At the end of twenty four hours if there is no vomiting

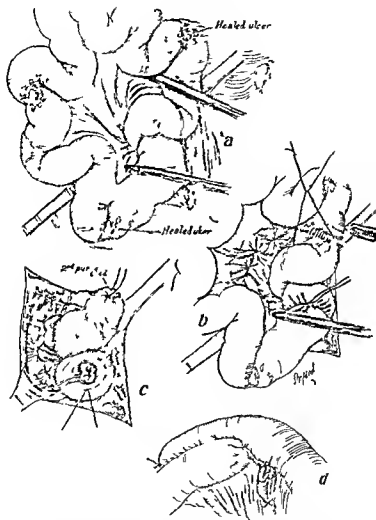


Fig 19—Obstruction of the ileum due to tuberculous ulceration *a* Ileum to be resected clamped off *b* crushing clamps removed ileum and mesentery ligated. Dotted line indicates line of resection *c* invagination of stump with purse-string sutures *d* side-to-side anastomosis of ileum. Opening in mesentery closed.

I would give the patient water then broth and then milk by the stomach

Examination of the gross specimen shows a healed tuberculous ulcer at each of these three points. At each of the points the healing made a stenosis. This of course has not been complete but the stenosis is so marked that only quite liquid intestinal contents could pass through. Fortunately of course in the small intestine the intestinal contents are liquid. A stenosis of the large intestine of this character would have long ago proved fatal because of the consistency of the contents of the large intestine. A careful histologic examination of these lesions will be made to determine absolutely the pathology.

This case comes under the general group of cases to which we have applied the term ileocecal tuberculosis and although in this particular case the lesion is limited to the ileum and does not involve the cecum very frequently both cecum and ileum are involved. In these cases the lesion begins in the mucosa or submucosa of the bowel and extends to the other coats of the bowel and later to the draining mesenteric glands and to a limited extent to the peritoneum. The condition differs very markedly from the cases which come properly under the group known as tuberculous peritonitis. In typical tuberculous peritonitis the lesion is necessarily hematogenous. In these cases of ileocecal tuberculosis although the lesion may be hematogenous we would have to admit also the possibility of a direct infection of the mucosa from food or the contents of the intestine. Possibly we would have to admit of the possibility of a direct infection of this portion of the bowel from tubercle bacilli in the milk or in other articles of food and we would have to recognize the possibility of infection by tubercle bacilli coming from a focus higher up as a lung tuberculosis with an infection of the intestine from swallowing sputum containing tubercle bacilli and their localization and development in the mucous membrane of this portion of the intestinal tract.

In the general handling of one of these cases it is fair to assume that these lesions are not necessarily the only lesions of tuberculosis in the individual. On that account the patient

should be given the benefit of the hygienic treatment that is usually adopted for general tuberculosis or lung tuberculosis. I think it would be wise to have this young man live in some climate where he can be outdoors the greater part of the year, and to make it for a long period of time the most important duty of his life to build up his resistance against a possible extension of the tuberculous process. One can be sure that we have not eliminated and removed at this operation all of the tuberculous disease in this patient, because I found a pretty general enlargement for some distance of the mesenteric glands, not only those mesenteric glands that drain this particular loop of bowel but the mesenteric glands some distance away. I think, therefore, it would be very possible with the building up of his resistance that he would make a complete recovery from this condition.

In discussing the surgical therapy of these cases of ileocecal tuberculosis I would like to emphasize the importance of doing here first the radical operation rather than a palliative operation of sidetracking the lesion. It is true that in some cases the condition of the patient is such as to make it impossible to do such a radical operation as we have done this morning in this case. This is particularly true in the presence of obstructive symptoms which demand immediate relief in order to save the life of the patient. We have in such cases done an anastomosis between the two sound loops of the intestine above and below the site of the lesion, and have secured a good deal of temporary benefit. The benefit, however, is not as complete and the prospect of cure is certainly not nearly as good as where we do the radical removal of the gross lesion. I am rather inclined to urge at least the serious consideration of the radical removal of the gross lesion in those cases where a palliative operation of anastomosis has been done, even though it has secured marked improvement, the radical operation, of course, being left to a time when the condition of the patient warrants such a step.

INJURIES OF THE SHOULDER-JOINT

Summary Two cases of injury to the shoulder joint. Case I—An extensive comminuted fracture of the shaft of the humerus and a dislocation of the shoulder joint—unsuccessful attempt at reduction without open operation—open operation—reduction by Gunn's method and application of Prolam bands, history of Gunn's method—after history of case.

Case II—A transverse fracture of the anatomic neck of the humerus with marked displacement of the fragments—treatment by open operation—fragments held in position by means of iodine catgut—after history.

November 6, 1918

I SHALL present to you this morning two injuries of the shoulder joint. The first patient is a man of thirty-five, a carpenter who fell a distance of about 16 feet among some beams

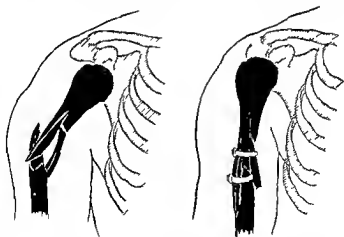


Fig. 20—Fracture of humerus and dislocation of shoulder joint

and sustained a very severe injury of the right arm and shoulder. The x-ray picture (Fig. 20) shows an extensive comminuted fracture of the shaft of the humerus and a dislocation of the shoulder joint. The injury is not compound.

When he came here two days ago I attempted to handle it without doing an open operation. I thought that I had reduced the dislocation of the shoulder and had secured a very good reduction of the fracture of the humerus. I placed it in a light plaster cast. The next day I had another x ray picture taken and found that we had not succeeded in reducing the dislocation. It will be necessary this morning to anesthetize him and make an open operation which I shall do under drop ether anesthesia.

You can see from the x ray picture the middle third of the shaft of the humerus broken into four or five fragments and greatly displaced. Fortunately there is no evidence of any injury of the musculospiral nerve as the man has no drop-wrist and no sensory paralysis. The dislocation of the shoulder is the usual subcoracoid dislocation.

The patient is now etherized and the field of operation has been prepared in the usual way. I shall make an incision over the fracture a little above the center of the humerus on the outer surface taking care to avoid injury to the musculospiral nerve. As I open down to the site of fracture I find a large amount of coagulated blood which I mop out with a sponge. The first problem to be treated is that of the reduction of the dislocation.

I now expose the lower end of the upper fragment and drill a good sized hole through it with a bone drill. I pass through this hole a very large sized piece of heavy copper wire about 1 foot in length. The ends of the wire are now twisted together firmly so as to make a loop with which I can exert the necessary amount of traction in reducing the dislocation. In order to secure a good purchase I place several thicknesses of gauze in the loop of wire so that I can make strong traction without cutting my rubber gloves or injuring my hands with the wire loop. I shall reduce this dislocation by the method which was taught by Moses Gunn who deserves more credit for our accurate knowledge of the mechanism of a dislocation than anyone else I know. Gunn as early as 1853 made a special study of the mechanism of dislocation especially of the hip and shoulder. This was

shortly after the introduction of anesthetics, and Gunn's course of reasoning was something as follows

Up to that time muscular contraction had been regarded as the main obstacle to the reduction of a dislocation but with the introduction of anesthetics this factor could be eliminated by producing complete relaxation of the muscles. Gunn's attention was at once called to this fact and he asked himself the question If the important factor preventing reduction of a dislocation is not muscular contraction then what is? And he sought to find the answer. He made a number of dissections on the cadaver removing the muscles about the shoulder joint and hip-joint leaving the ligaments intact. He would then produce a dislocation and study his specimen to ascertain what factor prevented easy reduction by manipulation. It at once became evident that when one makes a dislocation of the shoulder in a specimen of this kind and attempts by direct traction to reduce the dislocation the untorn portion of the capsular ligament at once becomes very tense and the stronger one pulls on the upper extremity let us say directly downward the more tense this untorn portion of the capsular ligament becomes. Gunn therefore formulated a rule that the most important factor in preventing the reduction of a dislocation by manipulation was the untorn portion of the capsular ligament. He followed this with a second proposition that in order to reduce a dislocation by manipulation one should relax that untorn portion of the capsular ligament and with a third rule that in order to accomplish this the limb should be placed in the position it occupied at the moment of escape and we should reverse the force which had produced the dislocation. Applying these principles to dislocations of the shoulder joint knowing that in almost all cases the portion of the joint capsule that is torn is the inferior portion we should adopt the following scheme of manipulation. Elevate the arm from the side almost in a vertical position. This relaxes completely the untorn portion of the capsule. Then make direct extension on the arm and have the assistant make counterextension by holding the thorax firmly on the table. The surgeon then should gradually while extension is being

applied, swing the arm down from the vertical position to a position almost parallel with the body, and at the same time the assistant who is holding the thorax firmly on the table should make counterpressure on the head of the humerus to replace it in the axilla. Almost invariably *this manipulation is successful* and very easily successful if it is properly carried out, at least in recent dislocations. Personally, I believe it is a much better method of reduction than the Kocher method of reducing dislocations of the shoulder. I believe that it is more often successful and that it carries much less risk than does the Kocher method. There is no rotation of the humerus and there is less risk of fracture of the humerus or of injury of the brachial plexus. The patient should be as a rule of course under an anæsthetic. Personally, I prefer gas anæsthesia which suffices or a very brief drop-ether anæsthesia. In some very powerful muscular subjects complete relaxation is necessary, and this can only be obtained by full ether anæsthesia.

Following out these rules of Gunn in this case I have one assistant fix the thorax firmly on the table and another assistant carries the broken arm up to an almost vertical position, and at the same time I carry the upper fragment through which I have placed this strong wire, also into that vertical position, making direct traction, and with a little counterpressure on the head of the humerus the dislocation is readily reduced. I would ordinarily be perfectly satisfied to handle a fracture of the humerus, such as we find in this patient without doing an open operation, but inasmuch as we have to make an open operation to secure reduction of the head of the humerus I am going to use a Parham band on this badly comminuted fracture to bring the fragments more accurately into position. This Parham

seems as though it would be the best mechanical means of handling this particular fracture. I pass around some of these Parham bands for your inspection and the instrument with which they are applied. It is made of a very tough steel which does

not easily break. It necessitates freeing the entire circumference of the bone for a small area, about $\frac{1}{2}$ or $\frac{3}{4}$ inch, so the band can be passed entirely around these fragments. I find that it is difficult to get a very good approximation with this first band as I tighten it, and, although I dislike to do so, it will



Fig. 21 —Cast used in reducing fracture of humerus

be necessary for me to introduce a second band in order to bring these fragments into a satisfactory position. I now introduce a second band in the same manner. I make a closure of the incision by some deep fine catgut sutures and close the skin incision with black silk, and place the shoulder and entire upper extremity in a plaster-of-Paris cast (Fig. 21)

After-history —This man went on to a good recovery. The x ray plates (Fig. 20) show a reduction of the shoulder dislocation and the two Parham bands in place on the humerus. The humerus united very satisfactorily with a little watery discharge for several weeks in the center of the wound although no evidence of infection. It may be necessary later to remove under local anesthesia these Parham bands and I should not hesitate to do so if the slight discharge does not entirely cease within a short time. The patient had for a time a rather marked atrophy of the deltoid but no paralysis. Fortunately, this proved simply to be the atrophy of disuse which is gradually disappearing under exercise.

I would like to emphasize a few points in connection with this case, because this problem of fracture of the humerus and dislocation of the shoulder is a complicated and difficult one to handle. Some years ago Dr. Charles McBurney wrote a very excellent article on this subject and recommended the open operation, drilling a hole in the lower end of the upper fragment large enough to introduce a large hook, very much like a beef hook, and using this hook for traction required to reduce the dislocation. I adopted McBurney's suggestion on several occasions. I have found however, that the plan which we used in this case, namely, the use of a heavy piece of wire is very much easier and more satisfactory than the use of the hook. With a loop of heavy wire one can obtain very much better traction than with the hook and a hole drilled in the bone can be made very much easier and very much smaller.

The second point I should like to emphasize is the really great value of the Parham band in these oblique fractures.

CASE II —The second case which I shall present to you this morning is another shoulder case which was brought into my service yesterday. A farmer fell about 13 feet from a hayrack and sustained a severe injury to the shoulder joint. He was seen by several very good medical men who anesthetized him and worked over the shoulder for about an hour, attempting to reduce the displacement. He comes here with an enormous hematoma about the left shoulder joint. It would be impossible

for me to make an accurate diagnosis here in this greatly swollen area without the use of the x ray. The x ray (Fig 22) shows a very clean transverse fracture of the anatomic neck of the humerus with marked displacement of the fragments. The upper end of the lower fragment projects into the axilla very much as we find the head of the humerus in a shoulder joint dislocation.

I ordinarily treat these cases without an open operation. I think however with this marked displacement and with this large amount of blood clot thrown out about the injury it will be better to make an open operation and remove the blood clot and sew the fragments together.

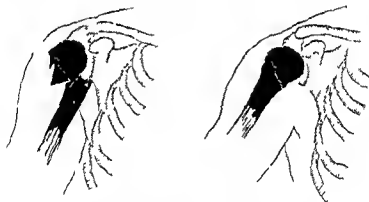


Fig 22—x Ray tracing of Case II

Under ether anesthesia an incision 5 inches in length is made through the anterior portion of the deltoid down to the fracture. You see what a large amount of blood clot and liquid blood we are turning out from around this injury. The transverse fracture is readily found the upper fragment first coming into view and then while very gently making extension and rotation the upper end of the lower fragment is brought into the wound. The upper fragment is drawn well out from it and it is difficult for me to place it into any position. It will therefore be necessary for me to bring the lower fragment out and abduct the entire arm in order to place both fragments in the same axis. As I

abduct it well out from the body—about 45 degrees from the body—you will see that the fragment comes very accurately into position (Fig 22) With a small bone-drill I now drill a hole first in the upper and then in the lower fragments and use some medium sized strong iodine catgut and sew the fragments together I shall introduce a second one about 1½ inches from this first so as to be sure to secure accurate apposition The arm is now dressed in this abducted position and held there by an extensive plaster-of-Paris dressing

After-history —At the end of ten days the stitches were removed and wound healing was found complete The arm was left in this abducted position for about three weeks Then the cast was removed and the arm simply put in a sling and the case went on to a very complete recovery of course with the usual atrophy of disuse that is necessarily associated with these cases but which disappears entirely after union is complete and the limb is exercised for a few weeks

TREATMENT OF INTESTINAL FISTULA BY MEANS OF BISMUTH PASTE

Summary Patient giving a history of long-continued stomach distress, followed by an acute attack of pain in the right upper quadrant and later the formation of an abscess operation followed by a duodenal fistula, treatment with bismuth paste—closure return of ulcer symptoms some months later accompanied by a marked retention of stomach contents, exploratory operation—ulcer of duodenum about to perforate, treatment—inversion of ulcer and posterior gastro-enterostomy, necessity for surgical therapy in cases of duodenal ulcer with complications, use of bismuth paste to control leakage from intestines and duodenum, demonstration of its use in two cases, one a gangrenous appendix with abscess and gangrene of the cecum the other a neglected appendicitis with an abscess between rectum and bladder

November 14, 1918

I WANT to present to you this morning a patient who has the following history

He is a man of twenty-seven, who has had for several years stomach distress, but not very severe. Then he developed a severe pain in the right upper quadrant of the abdomen, which put him to bed. A physician was called, who took charge of the case. The diagnosis was uncertain for some time. At the end of ten days or two weeks an abscess developed in the right upper quadrant of the abdomen, which was operated upon and drained. Considerable pus was found when the peritoneal cavity was opened. The exact cause of the abscess was not evident at first, but the operation was followed by a discharge of stomach contents or duodenal contents into the abscess cavity and out through the external drainage that had been provided, making it practically certain that he had a subacute perforation of the duodenum with an abscess around the site of perforation, which was walled off by a plastic peritonitis. The acute symptoms subsided after operation and there remained simply a fistula into the duodenum. This was treated with thick bismuth paste, and, fortunately, the opening in the bowel closed and the patient went on to a good operative recovery. His general condition

improved and he was in fairly good health for a number of months.

Lately the old symptoms of duodenal ulcer have recurred, the hunger pains coming on two or three hours after eating and relieved by soda or food taking. I have had him in the hospital for several days under observation and find that he has a marked retention of about 250 c.c. of food at the end of seven hours.

Taking the gross facts into consideration in this case, he had this perforating duodenal ulcer with abscess and now marked retention, I have without any hesitation urged an operation and I shall do, depending upon the conditions that we find, either the time of the exploratory, either a resection of the ulcer or gastro-enterostomy.

The patient is now anesthetized. You will notice that the incision of the first operation is about $2\frac{1}{2}$ inches from the midline over the outer portion of the rectus muscle. I shall not open the abdomen through this old scar, but shall make a midline incision. Opening into the peritoneal cavity I come first down to the stomach, and as I attempt to pull it into view, there are quite firm adhesions found binding it down to the anterior abdominal wall. I clamp these off, divide between and ligate them. Retracting the edges of the incision with blunt retractors I bring into view the pyloric end of the stomach and duodenum, and there is here as you see beautifully exposed (Fig. 23, a) an ulcer of the duodenum on its anterior surface which is just about ready to perforate. There is simply a gray gelatinous substance covering the floor of the ulcer and preventing the escape of intestinal contents into the peritoneal cavity. The ulcer, as you see, is a little irregular in shape and about the size of an ordinary bean. There is a good deal of dense induration about the first part of the duodenum and pylorus making

difficult to resect it and to obtain a good sized caliber extending from the stomach into the duodenum. I shall therefore, invert this ulcer that is almost ready to perforate, first with a continuous

Lembert suture of Pagenstecher linen, and over this I am now placing a fine catgut suture (Fig. 23, *b*). This will compromise very greatly the caliber of the pylorus and duodenum at this point, which, however, is something to be desired in this case. I shall now do a typical posterior gastro-enterostomy.

I pick up the omentum and transverse colon and draw them well out of the incision, exposing the posterior surface of the

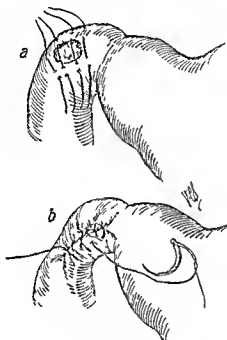


Fig. 23—Inversion of pyloric ulcer

stomach covered by the transverse mesocolon. I select an avascular point of this transverse mesocolon and make an opening in it with a closed pair of artery forceps. I stretch this opening into a good-sized tear, large enough to admit my two fingers. Out of this I draw the posterior surface of the stomach and place a clamp protected with rubber tubing on the stomach. I now pick up the first part of the jejunum and with a very short loop

I make a posterior gastro-enterostomy (Fig 24), using two rows of sutures, which I always do in these cases, just as Billroth in his early stomach and intestinal work—one row Lembert, which draws the jejunum and stomach together then make an incision through the peritoneum and muscularis



Fig 24 —Posterior gastro-enterostomy

but not through the mucosa, parallel with the line of sutures. A second row of sutures is inserted, picking up this flap of peritoneum and muscularis. The mucous membrane is now incised and a third row is used to suture the mucous membrane of the intestine and stomach together. This completes the posterior half of the anastomosis. Now, beginning with the last row of

sutures namely the one through the mucosa I complete the anterior half of the suturing. You will notice that before I make my final Lembert on the anterior surface I remove the clamps. I always do this because we can make a more accurate suturing with the clamps removed and we can determine whether the first two rows have succeeded in completely controlling the hemorrhage and have made water tight the ends by the anastomosis. The gastro-enterostomy is completed by taking three or four fine catgut sutures between the intestine and the opening in the transverse mesocolon. This is an essential feature and is one that should not be neglected. One of my colleagues told me recently that inside of a year he has had 3 cases of obstruction of the bowel in gastro enterostomy due to the intestine becoming strangulated in the opening in the transverse mesocolon. I have been fortunate enough never to experience this accident and I think it is due to the fact that we have always taken the precaution of suturing the intestine to the slit in the mesocolon. The external incision is now closed in the usual way. The pads and sponges are all accounted for. The patient is in excellent condition as he leaves the operating table.

In cases of duodenal ulcer with a definite history of serious complications such as this patient presents and the existence of a pyloric obstruction and retention of $\frac{1}{2}$ pint of fluid at the end of seven hours there can be no question in my mind but that the case should be given the benefit of surgical therapy. I am quite converted to the position that duodenal ulcers as a rule should be handled by medical management and that 80 per cent or more of them will be better handled in that way. Where however the patient presents a picture of serious complication such as perforation or hemorrhage or definite organic pyloric obstruction we would be wasting our time with medical management and we would not be doing our duty to the patient in the sense that we would not be giving him the best and safest means of cure from this condition.

I want to take advantage of this opportunity to discuss one little matter that I have already referred to in this case to give you the benefit of the experience which I have had with the same

method of treatment I refer to the use of thick bismuth paste to control leakage from the intestine and particularly from the duodenum. I do not know of any more distressing picture than that of a leak from the duodenum oo to the abdominal wall carrying with it the great irritation of the skin resulting from such a condition, and the great risk of starvation of the patient because of the escape of the stomach or duodenal contents through this duodenal perforation. I have met with this condition a number of times and as a result of several different pathologic pictures several times as in the case as presented by this patient of duodenal perforation either subacute or acute and with leakage after operation for either draining the abscess or repair of the leak.

A number of years ago one of my assistants in a similar case oo my service resorted to the use of bismuth paste. He found the bismuth paste recommended by Beck was useful but was not sufficiently stiff to answer the purposes in some of these cases and we devised a thicker paste consisting of 30 parts of bismuth, 50 parts of vaselin 10 parts of white wax and 10 parts of paraffin at a boiling point of 120° F and filled with this paste the crater like opening at the point of perforation preventing the escape of intestinal contents. Over the red and irritated skin outside of the opening we applied a rather stiff oint of zinc paste as a protective. We have succeeded in securing a closure of a number of these intestinal leaks by this method. It is of so much value that I think it should be more widely known. We have now used it not only in duodenal leaks but in several cases where we have had leakage after resection of the stomach, and in a number of cases where there has been a fistula in the small and in the large intestines. I have used it also in several cases where we have had leakage after resection of the sigmoid or rectosigmoid for carcinoma and diverticulitis.

When we begin with this treatment in the case of a good sized opening in the bowel the paste has to be used two or three or four times a day. Gradually as the paste prevents the escape of the fecal contents, the granulation tissue fills up the crater like opening of larger or smaller size and it is unnecessary to use

the paste so frequently and in many cases a few applications of the paste will suffice

We have within the last few months on our service had a beautiful demonstration of the value of this method of treatment in the case of a woman who had a gangrenous appendix with a large abscess and a gangrene of the cecum at the base of the appendix leaving a hole large enough to introduce the index finger into the cecum. On account of an associated lung abscess and the very bad condition of the patient it was impossible to consider any operative treatment for this large opening in the cecum. The opening was so large that it practically amounted to an artificial anus as for a time most of the fecal contents were passed from this opening and not through the rectum. It seemed rather useless to use the paste in a case of this kind but we persisted in its employment and within fifteen or twenty days the opening had been reduced to a mere fistula and this closed completely later after she had recovered from her lung abscess.

Another case comes to my mind in which this thick paste was of striking benefit. It was in the case of a neglected appendicitis with a long sausage shaped abscess extending down between the rectum and bladder. The lesion was almost entirely in the pelvis. There were no symptoms referable to the abdomen and the true diagnosis had been missed on that account by the attending physician. The child however attempting to urinate or defecate every fifteen or twenty minutes I was called in consultation and this attracted my attention to the necessity of making a rectal examination. Introducing my finger in the rectum I found at once the abscess which could be very distinctly felt about 3 inches above the sphincter. It seemed as though it was almost ready to perforate. I at once sent the child to the hospital and operated and found a long appendix with a perforation at its tip leading down to this abscess between the rectum and bladder. The appendix was removed and the abscess drained but unfortunately it was followed by an opening into the rectum about 3 inches above the sphincter. As a result for a number of weeks I had the unusual picture of a case operated

upon for appendicitis with a fecal fistula not extending into the cecum but extending into the rectum. Hard formed pieces of fecal matter would occasionally pass out through the appendiceal fistula and the problem seemed like a very difficult one from an operative standpoint at least. After several weeks I sent the boy to the hospital and under gas, probed the fistula carefully and found that it extended into the rectum. The difficulties of sewing up this opening in the rectum would, of course, be very great. On that account I resorted to the use of a small amount of this thick bismuth paste and fortunately, three or four applications succeeded in curing the fistula completely.

I would like on the basis of my experience with the use of these thick, heavy pastes to emphasize the importance of their employment in the class of cases which I have discussed with you particularly in duodenal perforation, gastric perforation, and perforation in the *small intestine or large intestine associated with fistula*. One must not expect too much from such a method of treatment. It will in a good many cases fail. On the other hand it certainly has proved in a number of cases on our service to have been life-saving in the sense that it has carried the patient through a serious period resulting from the leak, or else has been actually curative and prevented the necessity of any further operative treatment.

SPINA BIFIDA

Summary Spina bifida in an infant of three months not involving the cord and with no evidence of hydrocephalus operation—advantage of a transverse incision, operative findings, closure dressings prognosis possibility of the development of hydrocephalus, surgical therapy in treatment of hydrocephalus—unfavorable results, varieties of spina bifida—treatment—prognosis

November 17, 1918

I WANT to operate this morning upon an infant about three months old who has a spina bifida. You will see that as I uncover the child and roll it over on its face there is a large tumor mass irregular in shape, looking something like a tomato, situated in the lower dorsal region. As I examine this tumor carefully you will see that a very small part of it is covered with true skin, and this is simply on the margin and at its base. Most of the tumor is covered with a translucent membrane very thin and delicate, about the thickness of a very thin peritoneal sac in a hernia. The mass fluctuates and contains cerebrospinal fluid. As far as I can determine from examination of the tumor and the condition of the child, the spina bifida is limited simply to the membranes of the cord and does not involve the cord itself, as the child seems to have perfect control and function of its lower extremities and of the bladder and bowels. Usually when the cord is involved in a spina bifida situated as high up as this, we find more or less paralysis below this point, which does not exist in this case. The child is a very bright and normal looking infant otherwise. The head is well formed and normal in size and there is no evidence of a hydrocephalus. I regard the case as one favorable for operation, and I have told the parents that the chances of its recovering from the immediate effects of the operation are good and distinctly in the child's favor, and that there is probably about one chance out of three that the child will recover completely and grow up as a normal individual. We have operated on a number of these cases and have come to the conclusion that the simplest and best way of handling this deformity is essentially like handling an ordinary operation for radical cure

of hernia. Of course in the series of cases which we have had we have learned certain things about the technique, which I shall attempt to make clear to you.

The child is lightly anesthetized with ether. The entire field has been carefully prepared aseptically. I shall make a transverse incision in this case just as we do in an umbilical

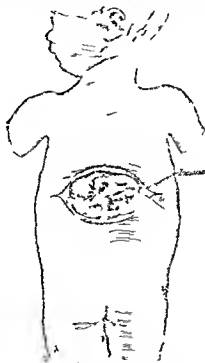


Fig. 25—Spina bifida.

hernia, because we have learned by experience that it is much easier to close the large defect that is made by dissecting out the tumor if we employ the transverse incision than if we employ a vertical incision. You will notice that I make a large transverse elliptic incision and save all the true skin at the base of the tumor that I can (Fig. 25). I carefully dissect back the integument above and below the tumor hugging the tumor

closely as you do in dissecting out a very thinned wall sac containing fluid. In spite of great care I have nicked the sac at one point and a dram or two of fluid escapes. This however, is not a serious matter, as I am simply making this dissection with the idea of not opening the sac because it is easier to make the dissection with the sac intact than after it is opened. You will see as I continue the dissection that I now come down to what might be termed the pedicle of the sac, which is probably $\frac{3}{4}$ inch long vertically and about $\frac{1}{2}$ inch wide. I now open into the sac and find that, fortunately, it does not communicate with the spaces around the cord containing cerebrospinal fluid. It seems to be walled off as you would find a hydrocele of the cord from the general peritoneal cavity by an obliteration of the peritoneal process at the internal ring. I think this is a very fortunate thing in this case. I now remove the entire sac and I can see the cord exposed for a distance of about $\frac{3}{4}$ inch in a position where three vertebral arches are absent.

The next step in the operation is the making of two flaps of the deep fascia covering the muscles of the back to cover in this defect in the arches. At one time efforts were made to make an osteoplastic closure in these cases, but it was soon found that this was of no value and gave no better protection than was afforded by covering in the cord posteriorly with flaps from the deep fascia covering the muscles of the back. You will notice that I make these flaps at right angles to the line of my skin dissection. These flaps are about $1\frac{1}{2}$ inches long and about $\frac{1}{2}$ inch wide on each side. I now bring the two flaps together by fine catgut sutures and you will see that we have now covered the cord with this dense connective-tissue layer. The incision in the skin and superficial fascia is now closed with four fine silkworm gut sutures and by a number of fine black silk interrupted sutures, closing it very accurately without any drainage (Fig. 26).

The dressing in these cases I have found to be a matter of very considerable importance. I take some rather stiff sterile ~~and of zinc paste and spread it on the dressing,~~ a broad layer of it about 4 inches long and 2 inches wide, and cover the skin

incision completely with this paste. My experience has been that this protects better than any form of dressing the wound

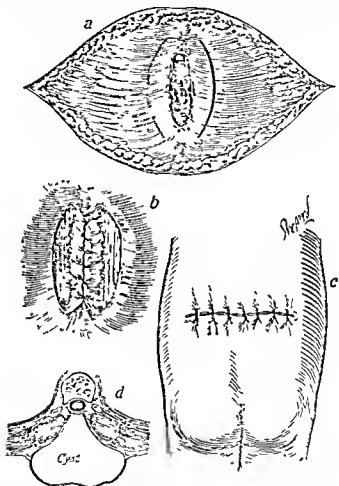


Fig 26.—Spina bifida a, Incisions in fascia for covering flaps, b, flaps sutured together over cord, c, closure, d, transverse section of spina bifida and cord.

in these cases against infection of the urine and feces, which, of course, are difficult to control in an infant. It seems to me that this case is particularly favorable, and yet we must re-

member that children of this age do not stand operating very well and even this comparatively simple short operation carries with it a good deal of risk, certainly 25 per cent

There is another matter, however, that I want to bring to your attention in connection with this case that is a considerable possibility of the development of hydrocephalus in these children with spina bifida. We have in several cases had the experience of operating upon a child with spina bifida who at that time did not have hydrocephalus curing the spina bifida by operation and then later have a hydrocephalus develop. It is probable that the fundamental condition that produces the hydrocephalus also produces spina bifida. I say that because we so often see the two conditions combined in the same case, and indeed the majority of children that have been brought to us with spina bifida have also had hydrocephalus. Where the two conditions exist I refuse to operate upon the case, because we have in no case helped these children as they have without exception gone on to a fatal termination from the hydrocephalus even where we have been able to cure the spina bifida.

A few years ago my assistants and myself took up the subject of the surgical therapy of hydrocephalus, and worked at it for several years operating upon a number of cases with the hope that we might cure these little patients or at least prevent the further progress of the disease. We drained a number of these cases into connective tissue outside the skull using silver tubes and glass tubes extending from the distended ventricles to the areolar tissue under the scalp but without benefit in any of the cases. As you probably know more elaborate methods have been employed such as draining the cerebrospinal fluid into the peritoneal cavity through a very complicated operation of laminectomy and laparotomy, and carrying silver wire or some non absorbable substance like silkworm gut from the membranes of the cord to the peritoneum. Harvey Cushing experimented with a number of these cases but I think without benefit, and this operation has been discarded. The use of a drain properly prepared and introduced from the dilated ventricle through a trephine opening into the areolar tissue under the scalp has also

been employed. Puncture of the corpus callosum has been used in a number of cases but on the whole I think we can state with a good deal of certainty that today we have no surgical therapy for hydrocephalus that is worth while and unless in the future some more favorable methods of handling these cases are introduced we should for the time being refuse any further experiments in this disease.

Coming back for a moment to the subject of spina bifida I desire to call your attention to the fact that this condition presents itself to us in three varieties as far as the structures involved are concerned. The first and simplest variety which is represented by the case we have just operated upon this morning is one in which the tumor is formed entirely independent of the membranes of the cord and of the fluid which they contain. The second form is one in which the tumor is situated below the spinal cord in the lumbar region and in which the nerves of the cauda equina are involved in the tumor so that if we remove the tumor we paralyze the lower extremities or as much of the lower extremities as are supplied by the nerve trunks that are cut in the dissection. There is a third condition in which the spinal cord itself is thinned out over the sac and in which the cavity containing the fluid is the greatly dilated central canal of the spinal cord. Of course in these cases any removal of the tumor would mean practical section of the spinal cord at that point and is not to be considered at all. As a matter of fact the cases of spina bifida that are amenable to surgical treatment are limited almost entirely to the first class of cases such as our little patient this morning. It is not always possible to determine this point beforehand but in a dissection where we find that the nerve trunks of the cauda equina are involved or the spinal cord itself the only thing the surgeon can do is to remove the great mass of tumor allow the fluid to escape to fold in as carefully as possible the nerves or the cord which are then exposed and to make a closure of the superficial fascia and integument as we have done in this case recognizing however the fact that the prognosis in these cases no matter how carefully handled, is extremely bad.

CARCINOMA OF FACE

Summary Epithelioma of the face destroyed on three occasions by cancer paste paralysis of facial nerve as a result either of lesion or of paste treatment, removal by means of electric cautery knife after history—covering of charred surface with Thiersch grafts—dressing of skin-grafts radical operation the best method of handling this type of carcinoma

December 4, 1918

THE first case I shall present to you this morning is this old gentleman eighty years of age, who comes to us with this very large superficial epithelioma of the right side of the face over the parotid region. He gives the following history

The process began about three years ago as a small superficial epithelioma and he has had it destroyed on three different occasions with cancer paste. There has, however, never been a complete healing and a more or less open sore has persisted since the beginning of the trouble

There is one interesting feature of the case that I want to call your attention to, which is quite often possible as a result either of the lesion or of the cancer paste treatment. There is a paralysis of the facial nerve on that side, at least that portion of it which supplies the muscles of the lip and cheek, and to a slight extent of the orbicularis palpebrarum, although that is not complete

A careful examination of the neck fails to show even at this stage of the disease any evidence of enlarged glands. Microscopic section of the lesion shows a typical epithelioma. I shall do here a radical operation following the plan of treatment which we have pursued for some time. There is no contra-indication in this case to a general anesthetic so that we shall do the extirpation of the cancer under drop ether

The patient is now anesthetized sufficiently to proceed with the operation. I shall cut this cancer out with an electric cautery knife, going very wide of the gross lesion and without respecting any tissue. It is not necessary for us to consider the

been employed. Puncture of the corpus callosum has been used in a number of cases but on the whole I think we can state with a good deal of certainty that today we have no surgical therapy for hydrocephalus that is worth while and unless in the future some more favorable methods of handling these cases are introduced we should for the time being refuse any further experiments in this disease.

Coming back for a moment to the subject of spina bifida, I desire to call your attention to the fact that this condition presents itself to us in three varieties as far as the structures involved are concerned. The first and simplest variety which is represented by the case we have just operated upon this morning is one in which the tumor is formed entirely independent of the membranes of the cord and of the fluid which they contain. The second form is one in which the tumor is situated below the spinal cord in the lumbar region and in which the nerves of the cauda equina are involved in the tumor so that if we remove the tumor we paralyze the lower extremities or as much of the lower extremities as are supplied by the nerve trunks that are cut in the dissection. There is a third condition in which the spinal cord itself is thinned out over the sac and in which the cavity containing the fluid is the greatly dilated central canal of the spinal cord. Of course in these cases any removal of the tumor would mean practical section of the spinal cord at that point and is not to be considered at all. As a matter of fact the cases of spina bifida that are amenable to surgical treatment are limited almost entirely to the first class of cases such as our little patient this morning. It is not always possible to determine this point beforehand but in a dissection where we find that the nerve trunks of the cauda equina are involved or the spinal cord itself the only thing the surgeon can do is to remove the great mass of tumor allow the fluid to escape to fold in as carefully as possible the nerves or the cord which are then exposed and to make a closure of the superficial fascia and integument as we have done in this case recognizing however the fact that the prognosis in these cases no matter how carefully handled is extremely bad.



Fig. 27—Carcinoma of face. a. Excision of Carcinoma. b. placing of skin graft, c. graft protected by screen

question of facial nerve paralysis as we already have this condition existing. It will be necessary to remove a large part or all of the parotid gland and to divide the terminal branches of the carotid artery the temporal and internal maxillary. The electric cautery knife which I am employing is admirably suited to work of this kind. I am cutting this carcinoma out as one would cut away rot in an apple (Fig 27 a). The electric cautery knife seals the smaller vessels and prevents any considerable bleeding. As I come down to the terminal branches of the external carotid the temporal and internal maxillary it is necessary as you see for me to ligate these by transfixing the tissues about them with a curved needle and ligating the vessels with fine catgut. I expose and remove the parotid gland and the periosteum of the posterior border of the ramus of the jaw for a distance of about $1\frac{1}{2}$ inches long and about $\frac{1}{2}$ inch wide. I have now removed the entire lesion and have succeeded in controlling the hemorrhage. I shall dress this with some iodoform gauze over this charred area and with a fairly copious dry dressing.

After history —The patient made an admirable operative recovery. At the end of ten days the superficial char from the electric cautery knife had separated leaving a red granulated healthy surface. I covered this entire surface with several large Thiersch grafts taken from the outer surface of his thigh. The lower jaw was uncovered for a distance of about $1\frac{1}{2}$ inches and $\frac{1}{2}$ to $\frac{3}{4}$ inch in width. This was covered with a skin graft as was the rest of the area (Fig 27 b).

In dressing the skin grafts we adopted a plan which has given us a good deal of satisfaction in these cases and that is of applying no dressing on the graft itself but using a wire frame something like the small Esmarch mask that anesthetists use covered with wire screen such as we use in windows. This frame was large enough to extend for a distance of about an inch around the skin graft and was held in position by strips of adhesive plaster without any other dressing applied (Fig 27 c). In other words the skin grafts were left freely exposed to the air.

Every particle of the graft took, and at the end of another ten days he was discharged from the hospital as an operative



Fig. 27—Carcinoma of face. *a* Excision of carcinoma. *b* placing of skin graft. *c* graft protected by screen.

cure. I am inclined to have this patient use moderate x ray treatments short of any possibility of burning for several months as an additional insurance against recurrence.

The case looked at first sight when he came to the hospital as a hopeless one and several surgeons had refused to consider a radical operation. We have however, had a number of these cases which have been permanently cured especially in cases of this particular type of slow growing epithelioma which have lasted for years without any regional involvement of the lymphatic glands. From a careful analysis of a number of these cases treated in our clinic we have come to the conclusion that this radical removal with the electric cautery knife followed by skin grafts is the best manner of handling these extensive skin carcinomata.

CARCINOMA IN THE AXILLA

Summary Carcinoma in the axilla in a patient presenting no evidence of a primary focus elsewhere in the body removal after treatment value of radical operation in carcinoma of the breast with extensive lymphatic involvement

THE second case which I shall show you this morning is an unusual one but an example of a small group of cases which we have been called upon to handle in the last few years. It is a case of carcinoma in the axilla apparently not involving the breast proper but developing probably from a remnant of the mammary gland tissue extending from the ordinary location of the breast up toward the axillary space.

This woman is fifty-five years of age. Her general health has been fairly good. She has noticed this hard mass in the axilla for the last five or six months and comes now for an opinion and treatment. I think there can be little doubt after our careful analysis of the case that this is a primary carcinoma in the axilla from a breast remnant. An exhaustive examination fails to show any primary focus of carcinoma elsewhere in the body.

Under ether anesthesia I shall expose this area fully making an incision along the outer border of the pectoralis major muscle with the arm extended at right angles from the side beginning the incision at the point of insertion of the pectoralis major to the humerus and carrying it along the border of the muscle to a point about opposite the nipple (Fig. 28). It may be necessary for me to divide the pectoralis major and possibly even the minor in the dissection required to remove the malignant mass. If however by retraction of these muscles I can gain wide exposure I shall not sacrifice them as I regard an operation here as probably palliative. Nor shall I remove the mammary gland itself unless I find that it is grossly involved for the same reason.

Opening the axillary space widely I now come down to a hard mass of tissue beginning just above the mammary gland

and extending up into the axilla, and involving very extensively the axillary glands as far as I can feel them in the angle between the clavicle and ribs. Holding the incision widely apart with retractors I expose first the axillary vein and use this as a guide in making the dissection. Freeing the vein quite fully I now expose the brachial plexus or nerves the axillary artery and its branches and keeping well out into what seems healthy adipose tissue I remove the entire lesion *en masse* (Fig 29). This necessitates my doubly ligating as you see the half-dozen branches of the axillary artery and vein and also requires the removal of two small intercostohumeral nerves which I find extending from the thorax to the inner surface of the upper arm. There is no distinct mammary gland tissue in this mass, at least to macroscopic examination. Although I have been able to remove all of the grossly involved tissue I am quite satisfied that the mediastinal glands are most certainly involved in this case because of the wide involvement of the axillary glands themselves. The incision is closed leaving a collapsible rubber tube about the center for drainage.

This case should be given the benefit of thorough x ray after treatment and there is a very good prospect of a distinct palliation from the operation and the x ray treatment and even a possibility of permanent cure but this I regard as exceedingly slight.

My attention has been recently called to the fact that some surgeons are preaching the doctrine that when the axillary glands are involved in a carcinoma of the breast operation is almost certainly merely palliative and almost never curative. I cannot accept this viewpoint and as a basis of the evidence in favor of the position which I can present to you I want to say that only within the last week a woman returned to my office upon whom I had done a very extensive radical cure for carcinoma of the breast and extensive involvement of the axillary glands more than five years ago. She had following operation a rather marked edema of the upper extremity. After operation I gave her physicians and friends an absolutely bad prognosis because of the extent of the axillary involvement. Her physician gave



Fig 28—Carcinoma in the sella

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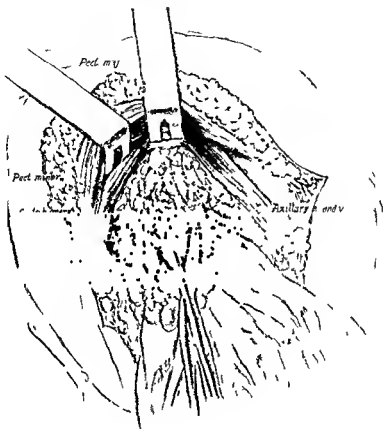


Fig. 79—Carcinoma in the axilla. Involved glands dissected out.



her thorough x ray after treatment, and, in spite of my fear of an early recurrence, she has already lived now more than five years after operation without any evidence whatever of a carcinoma. The edema of the upper extremity has not progressed. I must conclude now that it is due not to an obstruction of the lymphatics by carcinoma, but of an obstruction because of the wide removal of the axillary lymphatics and scar tissue interfering with the circulation. I can recall a number of very similar cases. As a result, therefore, I do not withhold from these patients with axillary involvement, even though extensive, the possible benefits of a radical operation. I am, of course cognizant of the fact that the prognosis in those cases in which there is no axillary involvement is very much better than in those where it exists. I do not think, however that it is proper for us to go so far as to take the position that there is absolutely no prospect of a cure, because I think some prospect does exist. I feel very strongly that these cases should be given the benefit of an operation because of the long palliation which I feel confident the radical operation has given these patients.

SARCOMA OF THE LABIUM

Summary Recurrence of tumor in the labium following removal fifteen months previously operation—technic of closure

THE third case I shall present to you this morning is that of a woman of sixty five, who came to us fifteen months ago with a large tumor in the labium about the size of a good sized hen's egg. This was quite movable and I was not willing to make a definite clinical diagnosis. I operated at that time under general anesthesia and made a wide radical removal of the tumor, which proved to be a sarcoma. She comes back to us now with a recurrence about half the size of the original mass and I shall do as I did before, make a radical removal of the recurring growth. The general condition of the patient is now not as good as it was at the time of the original operation. She has developed a condition resembling a paralysis agitans and there has been some thought among her attending physicians that this may be due to a secondary involvement of the nerves and possibly of the cord from this sarcoma. We have studied that phase of the case with a good deal of care and are not able to establish any definite relationship, and I am rather inclined to believe that the paralysis agitans like condition is independent of this neoplasm.

It is not difficult for me by making a large vertical incision to remove this mass and to keep well outside of what is grossly the neoplasm (Figs 30 and 31). The hemorrhage, as you see is rather profuse requiring the ligation of a number of vessels. I shall take the precaution as you see, to eliminate any possibility of a dead space by obliterating the cavity from which the tumor is removed by fine catgut sutures (Fig 32). This requires, as you notice, two rows of sutures to obliterate the space completely and the external incision is closed with fine black silk suture (Fig 33). I shall advocate the use of x rays as a means of after treatment. I think it is quite possible that she may

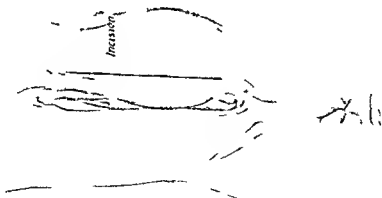


Fig 30—Sarcoma of the labium

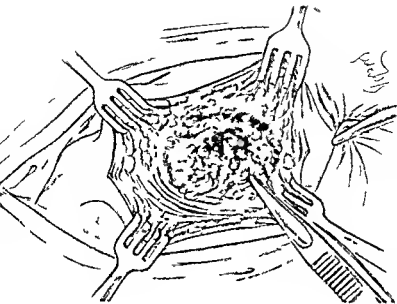


Fig 31—Sarcoma of the labium Tumor dissected out

have no further recurrence after this operation, although, of course, the history is not encouraging

I am glad of the opportunity of showing you this case because it is an unusual one, and we have had but few cases of sarcoma of the labium on our service

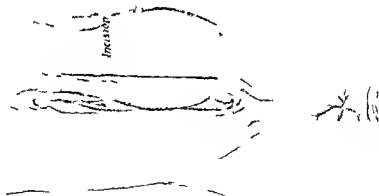


Fig 30.—Sarcoma of the labium

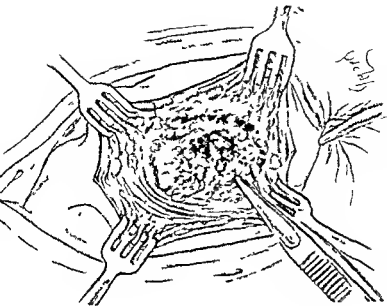


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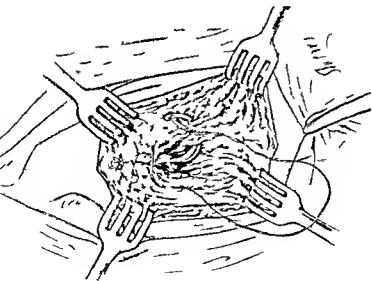


Fig. 1. General field in I t t p o

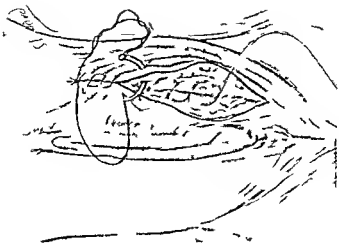


Fig. 2. General field in I t t p o



CLINIC OF DR. JOHN R. HARGER

SURGICAL DEPARTMENT OF THE UNIVERSITY OF ILLINOIS

SARCOMA OF THE LIVER IN A CHILD OF SEVENTEEN MONTHS; SARCOMA OF TESTICLE, WITH METASTASES IN THE LUNG SIMULATING TUBERCULOSIS

Summary History of case, examination, necessity for immediate operation, laparotomy—operative diagnosis—technic of removal of tumor, after history, microscopic examination of tumor mass report of a case of sarcoma of the testicle with metastases in the lung simulating tuberculosis—history, examination, diagnosis, removal of testicular tumor, after history, autopsy findings, comments

SARCOMA OF THE LIVER IN A CHILD OF SEVENTEEN MONTHS

I WANT to present to you today an emergency case in which the real diagnosis is somewhat obscure. This child was brought to the clinic at 4 30 P. M. apparently in pain, with a lump in the right lower part of the abdomen.

She is seventeen months old. Birth was normal and she was breast fed. At birth a small blue mark was present on the left upper lip, which soon became red. It increased in size quite rapidly up to the age of one year, at which time the child was placed under the care of Dr. Frederick G. Harris, who treated the growth with x ray and radium. Dr. Harris states definitely that the growth on the lip was a cavernous angioma, containing no pigment, that at no time did it show any evidence of proliferation of a malignant nature, and that it responded very rapidly to treatment.

The father states that for two or three months the child has been peevish and seemingly not well. Eight days ago he noticed that she did not want to eat, and four days later a lump appeared in the right lower part of the abdomen. However, the child

patient is suffering from a surgical lesion and that no time should be lost in an attempt to give the child relief

The child has been anesthetized with ether I shall make an incision along the linea semilunaris The peritoneum is discolored As I open the peritoneal cavity a large dark bleeding mass appears in the operative field and a considerable amount of dark bloody fluid bathes the entire body cavity The mass is nowhere adherent The entire surface is smooth and firm except over the most anterior portion where there is an irregular opening large enough to admit three fingers (Fig 34 1) Continuing the examination I find that the mass is attached to the right lobe of the liver by a pedicle about the size of the span of the thumb and finger of my examining hand A hurried general examination reveals no apparent involvement of the other abdominal viscera From the findings I would say that this patient is suffering from a sarcoma of the liver probably of a melanotic type

If this is a sarcoma the child's condition is hopeless Considering that the mass is attached to the liver by a pedicle the bleeding from the stump of which can be readily controlled and that there is already a large bleeding surface present which cannot be easily controlled I believe it would be good surgery to remove the mass

I am placing a small rubber catheter about the pedicle tying it fairly tight and putting a suture through it to prevent slipping I am also putting several No 3 chromicized catgut sutures through the pedicle and astride the catheter which thus plays a double rôle of controlling the hemorrhage and preventing the sutures from cutting into the liver tissue (Fig 34 2a) I am cutting one end of the catheter short and permitting the other end to project through the upper angle of the wound to facilitate removal at a later date should the child survive the operation The mass is removed by cutting within $\frac{1}{2}$ inch of the catheter and to the cut surface which is about the size of the palm of my index finger I will apply the actual cautery (Fig 34 2) In this way the bleeding is completely controlled I am inserting a light gauze packing and will close the abdomen

manifested a desire to play until the last two days and last night she cried nearly all night and acted as if she were in pain. The father further noticed that she had lost 2 or 3 pounds in weight during the past week and that her skin was getting yellow. During the past twenty four hours the bowels have moved several times, but no blood was noticed. She vomited once during that time.

Physical examination shows a well nourished but very restless child who cries and frets continually and forcibly resents any attempt at examination. Her skin is moist and warm and the color is not altered sufficiently to attract attention. The left upper lip shows a pale irregular superficial scarring with only slight traces of the above-mentioned growth. The chest is negative.

Inspection of the abdomen shows a moderate distention, which is uniform except for a slight elevation at McBurney's region 3 or 4 inches in diameter. On *percussion* tympany is quite marked and generally distributed except over the elevation which is distinctly dull. There is no dullness in the flanks. Liver dullness extends a trifle below the costal arch, but a definite tympanic area is noted between the liver and the dull elevated mass. Palpation verifies the tympany and in addition reveals a general rigidity and tenderness, which is more evident over the right side and especially over the mass. The mass is moderately firm and slightly movable.

Her temperature is 101° F per rectum and pulse 180. Two blood examinations both show a white count of 6100.

The child will immediately be prepared for operation. An S S enema was given which resulted in the passage of considerable flatus. This was followed by a combination enema which brought a slight amount of fecal matter but no blood.

Intussusception or an appendiceal abscess seems to be the most probable diagnosis but the nature and frequency of the stools and the results obtained by the enemas speak against the former, and the low blood count is not in keeping with the latter. However the presence of such a distinct mass together with the history and symptoms are enough to convince one that the

as quickly as possible, so as to subject the child to the least possible shock

After-history—The patient rapidly recovered from the effects of the short anesthetic. The operation was performed about 7 00 P M, and by 9 00 P M the pulse was 170. However, she soon became restless and in spite of our efforts the temperature went up rapidly, the pulse became weaker and slower, and she died about seven hours after operation. No autopsy was permitted. The mass removed at operation was examined by Dr W H Burmeister, who reported it to be a small round-celled sarcoma (lymphosarcoma) of the liver, with complete destruction of all the liver tissue with the exception of the bile-ducts.

While we are not justified in claiming that this was a primary sarcoma of the liver it is logical to suppose that if there were a primary focus elsewhere it would have manifested itself. With no lung findings and an absence of any other abdominal involvement or any superficial evidence of tumor, it seems likely that the tumor mass very probably had its origin in the liver. Had we been permitted to hold an autopsy the question would have been definitely settled.

SARCOMA OF TESTICLE, WITH METASTASES IN THE LUNG SIMULATING TUBERCULOSIS

In connection with this case I wish to cite another one of sarcoma, which came under my observation on March 15, 1916. For seven months previous the patient had been under treatment for a pulmonary lesion which simulated tuberculosis. I was called to see the man because of a very marked enlargement of the right testicle. The patient was thirty-one years of age, had had gonorrhea several years before followed by an attack of right sided epididymitis. Some time during the summer of 1915 he had a slight injury to the right testicle. In September he noticed for the first time that this testicle was larger than normal. He consulted a physician who told him he had a hydrocele.

In October he had a hemorrhage from the lungs. This was repeated at frequent intervals, and varied in amount from a

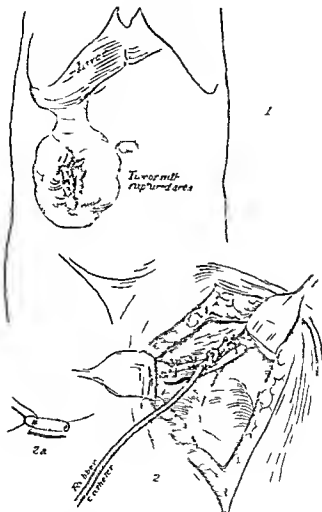


Fig. 34.—1 Indicates clinically the location, size and contour of the tumor and its relation to the liver. 2. Shows the pedicle after being ligated and tumor removed. 2a Diagram illustrating the placing of the suture about the loops of the catheter to prevent their cutting into the liver tissue.

ably a secondary sarcoma in the left lung, which was producing the hemorrhages and consolidation. The only indication for

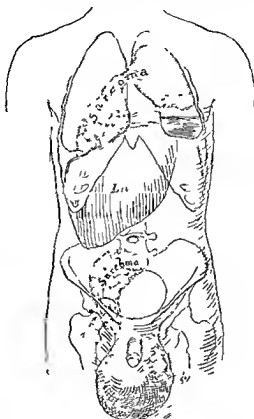


Fig 35.—Enormous size of the scrotum containing the primary sarcoma, which

to pressure from above the diaphragm caused by the sarcoma in the lung

operation was to relieve the patient of the burdensome mass and to enable us to verify the diagnosis microscopically. To that end I removed the right half of the scrotum with the tumor

slight show to a cupful or two continuing until January 1916 at which time an artificial pneumothorax was done. Repeated examination of the sputum did not reveal any tubercle bacilli. He lost gradually in weight and strength, and after the early part of January 1916 he was confined to the house. For the four or five weeks preceding my examination the temperature did not rise above normal at any time the pulse-rate varied from 90 to 120 and the respirations from 30 to 40. The testicle had continued to increase in size until it was so large and heavy that the patient was unable to turn in bed without assistance. It was never painful and gave trouble only because of its weight.

When I first saw the patient he was lying in bed in a semi sitting position. His features were pinched and he appeared poorly nourished. The breathing was rapid and shallow and he had an occasional cough. His tongue was furred and breath was foul.

Inspection of the chest showed marked emaciation and very limited respiratory expansion. Percussion gave a flat note over the greater part of the left chest but hyperresonance over the right except in the area between the sternum right nipple and liver which was dull and apparently continuous with the liver dulness. On auscultation the breath sounds were absent over the left chest but exaggerated over the right.

The abdomen was boat shaped with no tumor masses nor areas of tenderness apparent. The liver dulness extended three fingerbreadths below the costal margin.

There was a tumor about two-thirds the size of the patient's head in the right testicle. It was uniform in shape except on the ventral surface where there were two cone-shaped elevations about 2 inches in diameter. The whole mass was semisolid and did not fluctuate except over these two cone-shaped elevations. There was no tenderness except when the pedicle was put on the stretch. The superficial vessels were dilated and prominent.

From the history and symptoms I concluded that the patient was suffering from a sarcoma of the right testicle with prob-

showed it to be a tumor mass except for a small portion of the apex (Fig 37) Continuous with the left lung and extending across the posterior mediastinum and down into the right pleural cavity was a tumor mass about the size of a baby's head This mass was firmly attached to the diaphragm and right side of the pericardium, and when removal was attempted it was found to be extremely friable and of a light pink color. It was



Fig 37 —Sagittal section of the sarcomatous testicle partly covered with scrotum

this sarcomatous mass which gave dulness on percussion at the time of the physical examination The heart and pericardial cavity was free from any evidence of tumor growth

The liver extended to the level of the umbilicus and right iliac spine but was perfectly smooth and free from adhesions On cut section there was no evidence of tumor nodules The spleen, kidneys and pancreas showed no evidence of tumor

mass under local anesthesia on March 16, 1916. The tumor mass weighed 4½ pounds and contained about a pint of bloody fluid. On cut section the anterior two-thirds was pink, fibrous, and hard, while the posterior third was a pale yellowish, friable, degenerated mass (Fig 35).

The patient suffered no apparent ill-effects from the operation and the wound healed kindly in about three weeks. Gradually, however, he grew weaker, coughed moderately, and raised considerable mucopurulent material, which was occasionally blood-stained.

On April 10th he experienced a sudden severe pain in the right hip, which continued more or less constant, depending upon the amount of morphin administered. Subsequently any movements of his right leg or body caused intense pain. Four days later the patient died.

A very interesting state of affairs was found at autopsy. The right pleural cavity was obliterated laterally and posteriorly by dense adhesions, but the anterior portion of the lung was free and collapsed, and there were no palpable nodules in



Fig. 36.—Left lung in longitudinal section. Note the extent of the sarcoma, the small amount of normal lung tissue, a few tuberculous foci near the apex, and the attached pericardium.

this lung. The left pleural cavity was completely obliterated except for the lower lateral portion, which contained about a pint of bloody fluid. The left lung was completely consolidated and was removed only by taking the parietal pleura and a portion of the pericardium (Fig. 36). Section through the lung

CLINIC OF DR. GUSTAV KOLISCHER AND DR. J. S. EISENSTAEDT

MICHAEL REESE HOSPITAL

REPORT OF FIVE CASES

Summary Case I—Traumatic rupture of kidney Patient giving a history of injury to right flank, results of cystoscopic examination, choice of therapeutic measures to be employed, operation—technic—difficulty of suturing suffused renal tissue—transplantation of perirenal fat over site of suture

of the muscle splitting operation and the transplantation of perirenal fat, removal of stone

Case III—Nephrolithiasis Patient giving a history of constant pain in the right renal region following a nephrotomy several years previous, x-ray examination shows the presence of several concretions in right kidney, operation—difficulties encountered—removal of kidney, greater part of pathology due to technic employed in first operation—evil results which follow the cutting of the muscles

Case IV—Impacted ureteral stone Patient presenting symptoms usually ascribed to renal lithiasis, pelvic Roentgen picture shows a longitudinal shadow in the vesical region, and on cystoscopic examination the intravesical part of the ureter appears to be occupied by a dark shadow, diagnosis—stone in the lowest part of the ureter, treatment

Case V—Syphilis of bladder Patient giving a history of pains in bladder and some frequency of urination, cystoscopic examination, diagnosis—syphiloma of vesical mucosa

CASE I.—TRAUMATIC RUPTURE OF KIDNEY

THE first case we shall present to you this morning is an interesting one, inasmuch as it illustrates the possibilities encountered in diagnosing and treating a traumatized kidney.

The patient states that about a week ago he was run over by a truck, one wheel passing over his right flank. Severe shock followed the accident and he passed blood in his urine. After recuperating somewhat from the shock he experienced exquisite

In the right lower quadrant of the abdomen there was a smooth mass which extended from the symphysis and inguinal canal along the lateral margin of the pelvis to the iliac fossa and up to the sacrum and first lumbar vertebra. This mass was covered with a firm capsule. When this was broken, a pale pink, friable mass was scooped out with the hand. Under this mass the pelvic bones were eroded and absorbed and the smooth round head of the right femur was found lying inside the pelvic cavity (see Fig 35). It was the breaking through of the head of the femur into the pelvic cavity which produced the severe pain in the right hip four days before death.

The microscopic examination of the tumor removed at operation and the autopsy findings confirmed the diagnosis of primary sarcoma of the testicle with metastases in the lung. It is a well recognized fact that sarcomata produce metastases by way of the blood current far more frequently than by the lymphatics, while the reverse is true of carcinomata. Through the spermatic veins, the vena cava, and the right heart it is but a short course from the right testicle to the lungs. The direct extension of the process through the inguinal canal and along the brim of the pelvis may have started by way of the lymph channels of the spermatic cord but at the postmortem examination no enlarged lymph-glands were found anywhere.

That a sarcoma of the lung should simulate tuberculosis has been known for many years. William Hey, in 1809, described a testicular tumor the removal of which was followed by a fatal lung condition supposed to be tuberculosis. Doubtless, it was a metastatic sarcoma of the lung. O. E. Kunkel in the New York State Journal of Medicine April 1916 reported a case of primary melanotic sarcoma of the lung which had been treated for eight months as pulmonary tuberculosis. A diagnosis of malignancy was not made until the patient developed an effusion and died, but the true type of malignancy was determined only at the autopsy.

even if the hemorrhage finally stops definitely the hematoma around the kidney almost invariably becomes infected leading to all the dangers of a perirenal abscess while a definite organization of such a hematoma is apt to lead to a cicatricial compression of the kidney. Modern surgical technic offers all the advantages of repairing the damage done by the accident and the prevention of all the untoward sequelæ mentioned above.

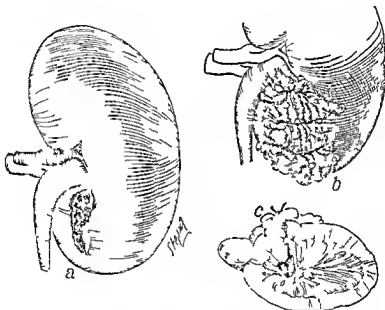


Fig 38 —a Ruptured pole of kidney b rupture closed with sutured fat c section showing placing of sutures.

The patient is now thoroughly anesthetized and we shall expose the kidney through a lumbar incision. We will first clean out this hematoma. The rupture in the kidney now presents itself. It extends from the lower pole into the pelvis and the ragged edges of the tear bleed rather freely (Fig 38, a). After cleansing the whole cavity by a liberal irrigation of hot dec. normal salt solution we shall proceed to the closure of the renal wound.

pain in the right hypogastric region. Suggillation was present, but no rupture of the skin. Since the accident he has not felt well. The urine occasionally contains blood, and movement of the body is always accompanied by pains in the right side.

On examination the patient appears to be somewhat anemic and the superficial mucosæ are slightly blanched. He walks with a noticeable limp favoring his right side. The skin of the ilio-costal incisura is discolored by a bluish area about the size of two hands. The normal curve of this region is flattened out and the whole area is sensitive to the touch. Careful palpation reveals the presence of diffuse deep resistance and sudden touching of the renal region excites defensive contraction of the overlying muscles.

The urine which he voided in our presence was slightly tinged with red.

Cystoscopy revealed a normal bladder mucosa. The left ureteral mouth showed nothing unusual. The right one was round slightly rigid and each urinary jet coming out of it was distinctly reddish. Upon slight massage of the right renal region a little filiform coagula appeared in the ureteral mouth.

Co-ordinating the details of the history and the results of our examination we are justified in making a diagnosis of a traumatic rupture of the right kidney. The persistence of the blue spot in the right flank speaks for continuous bleeding in this area, which supposition is verified by the examination of the voided urine showing fresh blood and by the observation of the ejaculation of bloody urine from the ureteral mouth.

The choice of the therapeutic procedure is influenced by the following considerations. While it is true that expectant treatment of rupture of the kidney for cases without alarming symptoms will furnish apparently good results this acquiescence to surgical inactivity is not justified in the majority of cases especially if they are qualified as our case is.

Persistent bleeding even of a minor degree is by no means an indifferent occurrence. That the bleeding is continuous is indicated by the persistence of the subcutaneous hematoma and by the staining of the urine. It is a matter of experience that

and fastened there by the ends of the closing sutures which are brought through the free edge of the transplant

These findings prove that the muscle-splitting approach to the kidney and the reinforcement of the pelvic wall by the transplantation of fat furnish ideal technical results. In contradistinction to this the next case will demonstrate the untoward results of cutting crosswise the muscles covering the kidney and the splitting of the renal parenchyma in order to extract a concretion

CASE III.—NEPHROLITHIASIS

This patient was nephrotomized several years ago for a renal calculus. He returns to us now because of a recurrence of the old trouble

The whole right renal region is swollen and very sensitive and the urine is packed with pus, blood and detritus. The patient suffers from constant pain which is occasionally accentuated by paroxysmal exacerbations. Cystoscopy and ureteral catheterization shows the left kidney to be normal while the right furnishes all the blood and pus. X-ray examination shows several dendritic concretions in this kidney

The patient is now prepared for operation. As one must anticipate that the old scar will offer difficulties in dissection it is contoured by an elliptic incision and further progress in the deeper tissue is attempted by dissection from this new incision. It is with great difficulty that we detach the superficial layers as the skin, subcutaneous fat and muscles are glued together by very vascular cicatricial tissue. The kidney proper is also intimately connected with the cicatricial composite covering it and the adhesions forming this conglutination are very vascular so that the exposure of the kidney can only be accomplished step by step. The whole kidney is mushy and its surface is studded with small abscesses and hemorrhagic spots. Palpation of the organ gives the sensation of various hard masses embedded in the parenchyma and crepitation all through the kidney. This makes it evident that as an excretory organ this kidney has passed all usefulness and we will therefore remove it.

It is to be kept in mind that the renal tissue especially if suffused does not lend itself easily to suturing. Either the sutures are tied loosely, and then the hemorrhage is not checked with any degree of reliability or if the sutures are knotted under pressure sufficient to control the hemorrhage they are apt to cut through the renal parenchyma.

This dilemma is avoided by transplanting perirenal fat over the site of the sutures. In this way the hemostatic qualities of the fat are utilized and the transplant furnishes a good padding the sutures running first through the fatty flap and then through the kidney substances (Fig 38 b c). The sutures may be tied with all the energy necessary for good coaptation and definite checking of the hemorrhage.

After the renal repair is finished a cigarette drain is inserted and the wound closed down to the drain.

CASE II—NEPHROLITHIASIS

The next case is also very interesting because it allows a revision of the technical results of a pyelotomy executed after the kidney was exposed through a muscle-splitting incision. The pyelotomy wound was closed with a transplant of perirenal fat after the method employed in the first case. The patient made an uneventful recovery. Recently however he has had a return of the kidney symptoms and x ray examination shows the presence of a stone in the kidney. As he complains rather severely and the objective symptoms are serious we have decided to reoperate.

We are making the usual flank incision. The penetration to the kidney furnishes evidence that the readaptation of the muscles and fasciæ was perfect and that no cicatricial distortion or undue fixation of the kidney has occurred. The transplant of fat still covers the pelvis of the kidney. In order to open the pelvis for removal of the concretion we will simply detach the flap of fat on one side and then clap it to the other side just as one would open a door. The renal pelvis is now incised and the stone removed. We are closing the slit in the pelvis with two fine catgut sutures. The fatty flap is replaced over the pelvis

The right ureteral mouth is brought into focus, a metallic sound is passed through the cystoscopic channel and introduced into the ureteral opening. About $\frac{1}{2}$ cm above this opening the sound is arrested and conveys to the examining hand a grating sensation.

The therapy will consist, first, in an attempt to deliver this ureteral stone into the bladder by endovesical manipulations, dilating the ureteral mouth by means of an alligator forceps introduced through an operating cystoscope. If this should prove insufficient, the circumference of the ureteral mouth will be nicked with the tiny shears of the operating cystoscope, followed by an attempt to extract the stone with an appropriate forceps, and pumping out of the liberated stone by means of a Bigelow pump. In case all these endovesical procedures should fail, the bladder will be opened by a suprapubic incision, the ureteral mouth and the adjacent vesical mucosa will be incised, and the stone freed and removed.

CASE V.—SYPHILIS OF THE BLADDER.

The last case to be presented and discussed represents a type of vesical pathology which, although not so infrequent, is quite often misinterpreted very probably because the possibility of such an occurrence is not thought of.

The patient a male of about forty years, complains of frequent shooting pains in his bladder. While during the day the urinary calls are not so frequent, they become bothersome in the warmth of the bed. The urine is quite often cloudy and will clear up again even without any medication. Microscopic examination of the urine does not show any kidney elements, but large epithelial cells, very few pus-cells, and much nondescript detritus.

On cystoscopic examination the fundus and vertex of the bladder are clear. The trigonum is of a brownish color throughout. Near the intra ureteric ligament are two well-circumscribed gray spots each the size of a lentil. Both these spots appear to be somewhat prominent and are surrounded by a narrow zone of bright red color.

It is fair to assume that at least the greater part of the pathology encountered is due to the method employed in the first operation. The cutting of the muscles led to the formation of extensive scar tissue at the point of severance, while this scar tissue, very probably, in its contraction interfered with the circulation *inside of the kidney*. The incision in the renal parenchyma necessarily led to cicatrization in the renal parenchyma again hampering the renal circulation. The incomplete hemostasis secured by simple sutures only without the aid of a transplant of fat permitted the deposition of numerous coagula throughout the renal substance adjacent to the incision these coagula very likely forming the nuclei for the disseminated lithiasis. The circulatory disturbances combined with the calcareous deposits finally led to the invasion and colonization of pyogenic germs which events brought about the destruction of a kidney which might have been saved by the employment of a method based on more refined details of execution.

CASE IV.—IMPACTED URETERAL STONE

This case is of some diagnostic interest. The patient complains of symptoms which as a rule are ascribed to renal lithiasis namely, occasional sharp pains in the kidney region, lancinating downward into the scrotum polyuria following these attacks. The urine is cloudy and shows under the microscope pus-cells and red corpuscles. x Ray examination of the kidney is negative but a pelvic Roentgen picture shows a longitudinal shadow in the vesical region.

Cystoscopy shows a normal bladder mucosa. If the beak of the cystoscope is pulled back in the fundus of the bladder and then turned for 90 degrees to the right so that the intramural part of the ureter is exposed to transillumination, the intravesical part of the ureter appears to be occupied by a dark shadow.

From the cystoscopic findings a diagnosis of concretion in the lowest part of the ureter is made. This assumption is confirmed by the introduction of a cystoscope for ureteral catheterization.

CLINIC OF DR CHARLES MORGAN McKENNA

ST JOSEPH'S HOSPITAL

REPORT OF THREE CASES

Summary Case I—Suprapubic prostatectomy Patient giving typical symptoms of prostatic hypertrophy cystoscopic examination pre-operative treatment suprapubic prostatectomy under local anesthesia—technic—necessity of careful closure of bladder wounds—advantages of glass drainage-tubes in these cases

Case II—Short circuit of the vas deferens Anastomosis of vas to epididymis for relief of sterility use of silver wire to ensure a patent lumen

Case III—Tuberculosis of kidney—nephrectomy Recurrence of frequent urinations following double castration for testicular tuberculosis cystoscopy and examination of catheterized specimen confirms diagnosis of tuberculosis of kidney removal of kidney—treatment of ureter

October 31, 1918

CASE I.—SUPRAPUBIC PROSTATECTOMY

WE have 3 cases this morning all of which I think will prove interesting to you The first is a prostatectomy with the following history

This patient Mr R was referred to me about one month ago He is seventy five years of age Venereal history is negative His habits have been very regular and his life you might say, a most regular one throughout About one year ago he began to notice frequency of urination This he says was first brought to his attention while riding in a machine and he thought at first it was due to the jarring but a little later on he noticed that he had to get up frequently during the night For a time the frequency subsided and then a little later returned About six or eight weeks ago the frequency increased in severity, becoming so pronounced that he could scarcely get any sleep

You notice that his physical condition is very good and I believe he will make a very satisfactory recovery from the opera

In order to scrutinize more thoroughly the surface of these patches the window of the cystoscope is brought as close to them as possible so as to take advantage of the magnifying power of the lens system at close proximity to the object to be observed. The surface of the patches appears now to be corrugated its appearance reminding one of the surface of the paper squeegees used for cleaning a blackboard.

The observer is struck by the similarity of the picture furnished by broad condylomata on other parts of the body and a diagnosis of a syphiloma of the vesical mucosa is made. In fact upon close examination the patient gives a history of syphilis acquired and somewhat loosely treated about ten years ago. There are adenopathies in the exterior sulci of the elbows and in the armpits. Laboratory tests and efficacy of antiluetic treatment will round out the clinical picture.

I have asked the patient to tell me when he feels pain, because if it is too severe, we will not continue the operation under local anesthesia. I am using a dry sponge to push the fat up and away from the bladder and to strip back the peritoneum. I am doing this gradually so as not to cause pain. You see that the bladder is very well exposed. The students have asked me many times how I can tell the difference between the appearance of the bladder and the peritoneum. The chief difference is in the color and the number of well-distended blood vessels on the surface of the bladder, which are not present on the peritoneum. I make quite a point of having the fat well off the area in the bladder which I am about to incise, because it plays such an important rôle in the repair of the tissues. I am putting in two silk guy ropes into the bladder, on each side of which I intend to make my incision. They will hold the bladder well in place. Now the assistant removes the bismostat from the catheter in the urethra. By so doing the fluid in the bladder can be withdrawn and I can open the bladder without having its contents run all over the open wound and on to the abdomen, a condition which is very annoying both to the patient and the operator. In fact it makes the operation a very messy one. A good many bladder operations are done under circumstances of this kind. I cannot put too much stress on this point. The guy ropes hold the bladder up well and it is not necessary to have the fluid in the bladder. Hence I use the catheter in the urethra.

I will now make an incision about 2 inches long in the bladder. This bladder is very thick. I am putting a suture at each end of the bladder incision so as not to tear it. Many times in making an incision in the bladder the lower angle is torn well under the pubic bone. It is very difficult to suture this tear and frequently the urine seeps into this space, producing an infection which is not recognized, and no drainage is instituted.

The next step is to expose the prostate. I am going to inject the capsule of the gland with novocain solution. The patient has experienced no pain so far in the operation. Before

tion. I sent him to the hospital about ten days ago. At this time the bladder contained about 500 c.c. of residual urine. On cystoscopic examination the bladder looks perfectly normal. Neither the catheterized specimen of urine or the passed specimen show the presence of infection. On entrance to the hospital his blood pressure was 178. He has been catheterized on an average of three times during the twenty four hours and we find this morning that his blood pressure has dropped to 160. I state this specifically because I do not think it is necessary to do a two-step operation in this case. So much has been said about the two-step operation that I believe its value in cases of long-standing bladder or kidney infection or where the blood pressure is high is very well understood. I think that for his age this patient is a very good risk. However I am going to do most of the operation under local anesthesia, using $\frac{1}{2}$ of 1 per cent novocain solution.

I am doing a nerve-blocking operation, using a small hypodermic needle for the skin and changing to a larger needle for the deeper tissues. Patients of this age do better with a local anesthetic than with a general, and the after treatment is more easily carried out. These old people do not do well under any kind of general anesthetic. It may be necessary for us to finish the operation with gas.

We have completed the injections and again paint the abdomen with tincture of iodin and proceed in the same manner as if the patient were asleep. While waiting for the tissues to become fully anesthetized we will fill the bladder with boric solution, so that it will be distended and can obliterate the perivesical space. This will make it easier for us to enter the bladder and will lessen the chances of injuring or cutting the peritoneum. You notice I am leaving a large catheter in the urethra closed with a hemostat. This catheter plays a most important part in the technic later in the operation.

Now we are making a suprapubic incision and you notice that the patient complains of no pain. We are down to the external peritoneum. If he has any pain during the operation, it will be at this point because the peritoneum is very sensitive

has already been prepared. A No 2 chromicized catgut suture is placed through the tube wall about 2 inches away from

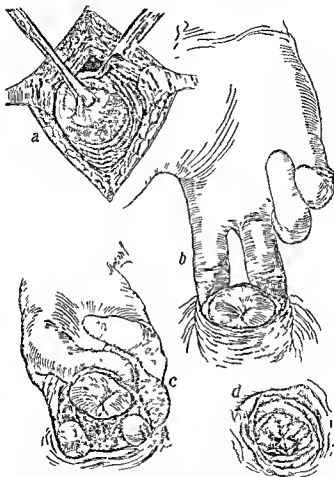


Fig 39—Suprapubic prostatectomy *a*, Prostate pulled up and mucosa incised, *b*, *c*, prostate shelled out with fingers, *d*, mucosa sutured.

the end introduced into the bladder. We always insert the tube at the upper angle of the bladder incision and suture it to the wall of the bladder. We will put in a number of interrupted

attempting to shell out the prostate however, we will give him a little gas. Now with the retractors in place and the electric light attached I can see exactly what I am going to do. I am using a little different technic in this operation from the one usually employed. I am making a circular incision about the urethral opening which includes the anterior and posterior sides of the prostate. I have now a well-defined cleavage of the prostate both anteriorly and posteriorly (Fig 39 a). I can now introduce my finger between the capsule and the gland proper and separate it very rapidly. I am going all the way around posteriorly and bringing my finger up anteriorly. I roll that one finger on either side of the urethra anteriorly and separate the prostate proper from the anterior mucous membrane (Fig 39 b and c). In doing this I am trying to save as much of the mucous membrane as I possibly can. By so doing I have the prostatic urethra fairly well separated from the gland proper and when I cut it off I will have a cuff of the urethra to attach to the mucous membrane. You notice this gland is intact and removed in one piece. Now the point I would like to have you observe is the small amount of hemorrhage that has taken place so far and as the mucous membrane falls into the prostatic space it covers nearly the entire space. I am going to use some hot irrigations to remove the large clots and débris which may be in the bladder. We will now dry out the space with a sponge on a long stick. These sponges are made especially for this work. They are round and just fit into the space from which the prostate has been removed. You observe that we have scarcely any hemorrhage. In fact it will not be necessary to use an artery forceps in the bladder. I am putting in three stitches, one on each side uniting the anterior and posterior mucous membranes of the bladder (Fig 39 d). It is not necessary to put this stitch into the urethra but I think it will help to make a firmer union than if we allow the wound to granulate of itself.

We will stop the gas anesthetic as the tissues are sufficiently anesthetized from the novocain to enable us to finish the operation without causing the patient any pain. The drainage-tube

wearing the dressings applied today. There will be no drainage outside of the tube and no foul-smelling urine. That, I think, means so much to these patients, because they need the best atmosphere following operation that we can possibly give them.

CASE II.—SHORT CIRCUIT OF THE VAS DEFERENS

This patient, M. S., aged thirty-four years, has been married for eight years and has no children. He gives a history of having had a double epididymitis eleven years ago following a Neisserian infection. An examination has been made for spermatozoa, which was negative. Without going into a discussion of the anatomy, I am going to do a short circuit of the vas with the epididymis.

I am changing my technic from that employed a few years ago. First we will cut down on the vas about 2 inches above the testicle. The cord is now exposed, and we will separate the vas by palpating the cord between the finger and thumb. Because of the consistency and color the vas is easily located and exposed. With a fine knife or bistoury an incision is made into the vas and a 10 per cent argyrol solution injected. If the lumen is patent a black urine can be withdrawn from the bladder. Now we will introduce a small silver wire into the lumen of the vas, permitting it to remain in place with about 4 inches exposed at the point of opening in the vas. I used to bring the wire out through the wall of the vas and draw it through the skin, but that causes too much traumatism to the vas itself, so we will bring it through the point of anastomosis with the epididymis and out through the skin opening (Fig. 40).

I will next open the epididymis at about the middle third. We first look for free spermatozoa, which you can see are very plentiful, looking like pus mixed with blood. Two sutures of 00 chromicized catgut are used for the anastomosis. The silver wire is brought through the epididymis and out through the skin wound (Fig. 40). The skin is closed in the usual manner and the wire protected by gauze. The wire can be removed in four or five days, thereby leaving an opening into the vas. If the wire is not used the lumen fills up and is occluded with a

chromicized catgut sutures in the bladder closing it up to the tube. I always pay particular attention to the closure suturing each layer from the bladder out to the skin, making it water tight up to the tube. To make the incision absolutely water proof I am putting in a continuous suture over the interrupted ones in the bladder. I have never experienced any difficulty with leakage where this method has been employed. We will not put a drain in the perivesical space. I sometimes believe that a drain in the perivesical space does more harm than good because oftentimes infection is carried into that space that would otherwise not reach it. I feel that the sutures in the bladder are sufficient to prevent leakage into this space. We are accurately closing the muscle and fascia up to the tube. The skin is closed with horsehair. As I have said in some of the previous clinics I am placing the skin sutures well back from the incision so as to avoid keloid formation. I am quite certain that placing the sutures too close to the margin of the wound is a cause of keloid formation following operation.

This right angled glass tube which I am holding is made especially for this work. The long end of the glass tube (2½ inches) is placed in the rubber tube extending inside the rubber well beneath the skin and muscle. I always introduce this tube myself to be absolutely sure that the rubber tube does not bend on itself because many good operations have been spoiled by the tube simply bending over on itself obstructing the drainage and causing a general infection from the bladder out to the skin. When the patient is taken back to his room the assistant will attach a rubber tube to the distal end of the glass elbow joint for bedside siphonage drainage which process is familiar to you. This keeps the wound and abdomen clean. This is most disastrous to the patient delaying the convalescence and endangering his life. We must not forget that we are dealing with old men whose resistance is low and every precaution must be taken not only in the operation but in the after treatment.

I shall take great pleasure in having you see this case in four or five days and I am quite certain that, provided no infection occurs the abdomen will be clean and the patient will still be

CASE III—TUBERCULOSIS OF KIDNEY—NEPHRECTOMY

The next case is a rather interesting one Mr S, aged twenty seven, single a civil engineer, was referred to this clinic because of frequent urination He had a double castration performed three years ago both epididyma and testicles being removed He says the diagnosis at the time was tuberculosis of both testicles At the time of operation he was troubled with frequent urinations which have gradually become more severe

Cystoscopic examination shows a marked cystitis in the trigone, and especially well marked about the orifice of the right ureter Cultures made from the catheterized specimen of urine show a great many tubercle bacilli The bladder was well irrigated and a ureteral catheterization done The urine from the right side shows a great number of tubercle bacilli present, while that from the left side is normal He complains of pain in the right side and palpation of the right kidney elicits considerable pain He gives all the typical symptoms of a right sided tuberculosis

I am going to cut down on the right side and remove the kidney You notice that I am dividing Petit's triangle and elongating it toward the brim of the pelvis so as to remove the ureter with the kidney You can see the perinephritic fat, or the fatty capsule The patient is so thin that it will be easy to deliver the kidney I have mentioned before that the delivery of the kidney is one of the most important steps in the operation especially in doing a nephrotomy or removing a stone from the kidney where the kidney is incised but not removed I sometimes think that we cause so much trauma in these operations that the kidney is left in a serious condition You see this is a fairly large kidney without much swelling at any particular place but inasmuch as the urine from this side showed the presence of numerous tubercle bacilli we know the organ is tuberculous and should be removed I am ligating the vessels first separately, then both together, using chromicized catgut

We will now dissect out the ureter and tie it off close to the bladder wall The easiest way to locate a ureter when not following it down from the kidney is to lift up the peritoneum

blood-clot which becomes organized so that the operation is of no value

The other side will be operated in the same manner Make the incision just long enough to expose both vas and epididymis

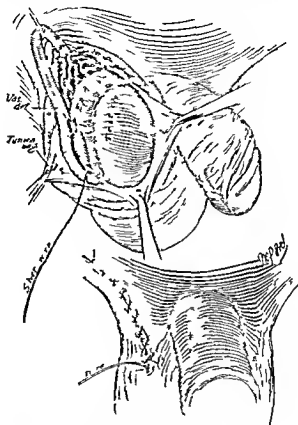


Fig 40—Short circuit of the vas deferens anastomosis of vas and epididymis placing of silver wire.

You will remember that the obstruction to the spermatozoa occurs usually in the globus minor

We will report on the success of this case at a later date

CLINIC OF DR. MAXIMILIAN J. HUBENY

CHICAGO POLICLINIC HOSPITAL

ROENTGENOLOGIC DEMONSTRATION OF SEVERAL UNUSUAL CONDITIONS OF THE GENITO-URINARY TRACT

Summary The Roentgen ray as a diagnostic aid report of 3 cases in which the roentgenologic examination showed the presence of unusual conditions in the genito-urinary tract bibliography

THE Roentgen ray as a diagnostic factor is an accepted adjunct to our already heavily laden armamentarium. Its diagnostic aid is so useful that its universal employment as a routine method should be one of the first procedures thought of. Its convincing disclosures are sometimes so complete and so surprising as to immediately make a non-obvious lesion or etiology an obvious one. Tangibilities often replace sophistries, with the subsequent institution of correct treatment, thereby shortening the convalescence of the patient, which necessarily enhances the prognosis.

Most of the following cases are relatively rare, and the employment of the Roentgen method of diagnosis in these particular instances assisted very materially in accounting for the symptomatology.

CASE I—Referred by Dr. A. H. Waterman. Male, aged seventy-one, no venereal history, no special previous ailments bearing on present complaint.

Present Complaint—Frequent desire to urinate, with feeling of incomplete evacuation. This has been present for about ten years. There is a marked feeling of fulness after eating, with a gradual loss of weight covering a period of four years. Normal weight is 215 pounds, while present weight is only 174 pounds.

at the bifurcation of the iliac artery and roll the ureter over your finger. The ureter is now ligated. I will place a small cigarette drain at the lower angle of the incision, and close the wound with interrupted catgut sutures and the skin in the usual manner.

On splitting the kidney you see the tuberculosis in its different stages. The cavity here is well marked and shows an old infection while the area below and close to the pelvis is partially broken down. The bright red areas show active tuberculosis. A microscopic examination will be made.

was diagnosed regardless of the inability to void only a little urine even with catheterization

Before cystoscopic and other examinations could be made the patient exhibited marked toxic symptoms necessitating im-



FIG. 41. Ileum lifted out of pelvis by a distended bladder. In one case this was due to retention because of large prostate; in another case the retention was due to a mucous fold between two lobes of the prostate.

mediate surgical interference. A suprapubic incision was made into the bladder followed by the voidance of a large amount of urine. Examination revealed a vesico-urethral barrier,

On examination the abdomen is flabby and pendulous. Palpation reveals a tumor mass in the suprapubic region extending as high as the umbilicus. There was slight fluctuation, but no succussion was obtainable. Digital examination revealed a large prostate. Examination of the urine was negative. A clinical diagnosis of lipoma was made.

A Roentgen examination following the administration of an opaque meal was made in the hope that important information would be obtained. The most interesting findings were exhibited six hours after the administration of the opaque meal at which time the barium was contained in the jejunum and ileum. The contour was such as to indicate the presence of a hydrostatic tumor because of the semicircular conformation. Usually the terminal ileum lies in the true pelvis but in this instance it was forced up beyond the pelvic brim as high as the promontory of the sacrum. A tentative diagnosis of patent urachus was made. Catheterization was unsatisfactory. Up to this time no cystoscopic examination had been made. When this was done, 39 ounces of residual urine were obtained. As soon as the residual urine was withdrawn the tumor mass completely disappeared.

The interesting features in this case are the peculiar and significant roentgenogram and the paradox of negative urine with such marked residual urine. The conditions making the latter possible must have existed for a long time. Prostatectomy gave complete relief.

CASE II—Referred by Dr. Esph. L. Smith. Male, aged forty six. History of venereal infection sixteen years previous. Has always had a sensation of incomplete urination with occasional attacks of cystitis.

Present Complaint—Acute and complete retention of urine.

Palpation revealed a large distended mass in the suprapubic region. Digital examination of prostate was negative. At the time of presentation of patient catheterization was unsatisfactory, only a few drops passing at a time. A Roentgen examination, similar to the one made in Case I, was performed with the same parallel features resulting whereupon a bladder retention

was diagnosed regardless of the inability to void only a little urine even with catheterization

Before cystoscopic and other examinations could be made the patient exhibited marked toxic symptoms necessitating im-



mediate surgical interference. A suprapubic incision was made into the bladder followed by the voidance of a large amount of urine. Examination revealed a vesico urethral barrier

which appeared to be a simple fold of membrane smooth thin, and almost transparent extending from one lobe of the prostate to the other. Because of the depressed state of the patient no further surgical work was done. Convalescence was uneventful. Catheterization was done during this period with a continuation of self-catheterization by patient since that time.



FIG. 4.—Normal bladder distended with air

The interesting feature in this case was the ineffectual passage of the rubber catheter at the time of the original examination the eyelet of which came in contact with the mucous fold thereby causing an obstruction to the outflow.

CASE III—Referred by Dr. Philip Kreis. Male aged thirty-four. Gonorrheal infection three years ago. Complains of frequent and interrupted urination sometimes in six or more phases with pain in lower abdomen and right lumbar region. He

never had symptoms of vesical distress before contracting gonorrheal urethritis. The urine was foul, cloudy, contained pus and red blood cells and an abundant amount of colon bacilli and



Fig. 43. Air inflation of bladder showing diverticulum verified by injection of argentes also cystoscopic examination

staphylococci. A catheter was inserted in the bladder immediately after urination and 120 c.c. of cloudy urine withdrawn. Cystoscopic inspection showed a mild chronic cystitis, slight trabeculation of the bladder wall, and a diverticular opening

in the posterior wall about 1 inch behind the right ureteral orifice. Upon exerting a downward pressure by forced coughing a milky fluid was observed emanating from the diverticulum. On in-

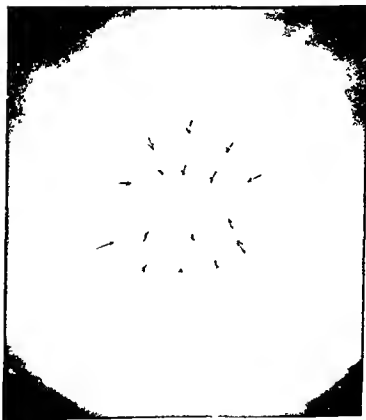


Fig. 44—Air inflation of bladder showing diverticulum formed by injection of argentine; also cystoscopic examination.

roducing the beak of the cystoscope into the sac its walls could distinctly be seen to be chronically inflamed. Clear urine was obtained through a catheter which was readily introduced into the left ureter. However, when passing the instrument on the

right side a decided resistance had to be overcome in the pelvic portion of the ureter, and cloudy urine was obtained from the corresponding kidney. This urine showed evidences of pyelitis.

A roentgenogram with a shadowgraph catheter in this ureter showed its pelvic portion turned downward and outward from its normal course.



Fig. 45.—Bladder filled with cargentos shadow within a shadow showing diverticulum verified by air inflation also cystoscopic examination.

To fortify the above information inflation of the bladder with air was performed and stereoscopic roentgenograms were taken—one set with the patient prone and the other set with the patient supine. The diverticulum was plainly demonstrable. Following this cystograms (injection of bladder with cargentos) were made again verifying the presence, location, and extent of the diverticulum. Operation gave complete relief.

CASE IV.—Referred by Dr. Robert A. Herbst. Male, aged

twenty-one single Occupation schoolteacher States that he has had incontinence of urine since puberty This has been both diurnal and nocturnal and more marked upon exertion For the last three or four years he has been troubled with frequent and imperative urination Sometimes the urinary evacuation felt incomplete

Upon examination the external genitalia were found to be normal Rectal examination revealed prostate gland normal



FIG. 46. End of ureter with catheter. Catheter was inserted and was lowered to the bladder. Catheter is in the bladder. Catheter is in the bladder.

in size and consistency Seminal vesicles were palpable The catheterized urine was acid in reaction Specific gravity was 1025 albumin was present but no sugar The sediment contained many red cells some pus and mobile bacteria Stained smear from sediment showed pus cells and ordinary pus cocci Cystoscopic examination revealed a marked trabeculation of the bladder and a generalized reddening and injection of the entire mucosa The ureteral orifices were distorted and asymmetric

ally placed. Cystography revealed an asymmetric bladder with a large patulous and redundant right ureter which permitted the inflow of the thorium into the pelvis of the kidney the lower



Fig. 4.—Sacralization of transverse process of fifth lumbar vertebra. Asymmetric sacrum with deviation. Figs. 48, 49 and 50 illustrate the same case.

margin of which was visible on the plate. A second similar examination was done several weeks later for the express purpose of getting the renal pelvis but to our amazement and disap-

twenty-one, single Occupation schoolteacher States that he has had incontinence of urine since puberty This has been both diurnal and nocturnal, and more marked upon exertion For the last three or four years he has been troubled with frequent and imperative urinations Sometimes the urinary evacuation felt incomplete

Upon examination the external genitalia were found to be normal Rectal examination revealed prostate gland normal



Fig. 46—Bladder filled with contrast medium. Shadow within a half way showing diverticula verified by cystoscopic examination.

in size and consistency Seminal vesicles were palpable The catheterized urine was acid in reaction Specific gravity was 1025 albumin was present but no sugar The sediment contained many red cells some pus and mobile bacteria Stained smears from sediment showed pus cells and ordinary pus cocci Cystoscopic examination revealed a marked trabeculation of the bladder and a generalized reddening and injection of the entire mucosa The ureteral orifices were distorted and asymmetric

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Fig. 47—Sacralization of transverse process of fifth lumbar vertebra. Asymmetric sacrum with deviation. Figs. 48, 49 and 50 illustrate the same case.

margin of which was visible on the plate. A second similar examination was done several weeks later for the express purpose of getting the renal pelvis but to our amazement and disap-

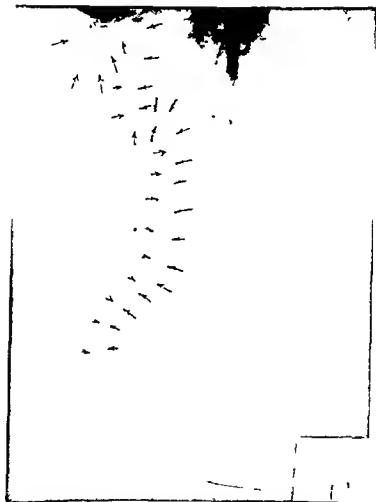


Fig. 48—Injection of bladder with thorium sulfate showing a symmetry with patulous, distorted and redundant ureter permitting a reflux into the pelvis of the kidney. Patient face up.

pointment no opaque material entered the ureter. It was then decided that a third examination with ureteral catheterization

be done, but it was impossible to pass the opaque catheter, thereby preventing the taking of a pyelogram

The instructive value of this case is, first, the possibility of urogenic infection of the kidney by reflex of urine, second,

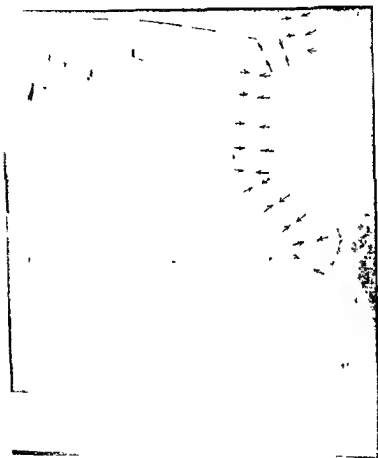


Fig. 49—Same as Fig. 48 Patient face down

the redundant ureter occasionally kinking with a consequent retention of urine proximal to the kink then after straightening of the kink the passage of residual urine, third the association

of anomalies. Oftentimes where one anomaly exists others are liable to be present. In this instance the roentgenogram also showed a marked asymmetry of the sacrum with sacralization of the right transverse process of the fifth lumbar vertebra.



FIG. 40.—Multiple prostatic calculi. Up to time of prostatic with an enlargement of prostate. Liberated twenty three or res.

CASE V—Referred by Dr. Walter Venn. Male, aged fifty-seven, excellent physical condition. Had measles during childhood, pneumonia at fifteen years of age, typhoid at thirty-five, and gonorrhea at twenty years of age.

Present Complaint—Frequency of urination began about two years ago. Recently he has had occasional attacks of inability to urinate with burning on urination but not before or after the act. A constant desire to urinate was not present. The frequency has gradually increased until at the present time it is six or seven times during the day and two or three times at night. He passes but a small quantity of urine at a time. About two months ago following a fall he was unable to urinate from 2 o'clock in the afternoon until late at night. A catheter was used at that time but not since.

Examination showed the external genitals negative. Reflexes were good. Prostate was greatly enlarged, smooth, regular and even with no nodules or tender areas. Seminal vesicles were not palpable.

Blood examination showed 7500 leukocytes and 58 per cent hemoglobin. Blood pressure was 128 systolic and 68 diastolic. Urine was bloody with a specific gravity of 1020. There were few epithelial cells, many red blood cells, a few leukocytes and no bacteria. Culture of the urine was negative.

The roentgenograms showed the presence of many calculi (54 could be counted on the plate) situated medially and suprapubically corresponding to the usual location of prostatic stones. Chemical analysis by Dr. R. W. Webster showed the predominance of calcium carbonates. A roentgenogram of a few of the calculi which were expressed after prostatic massage showed that a fusion of several smaller calculi had taken place.

In referring to the Bibliography no citation was found presenting the features of Cases I, II and IV in which the Roentgen method of diagnosis was applied to assist in the determination of a diagnosis. According to the best knowledge of the writer these cases are original in presentation.

The other two cases, while unique and interesting, are amply discussed in the appended Bibliography.

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CLINIC OF DR. GEORGE E. SHAMBAUGH

PRESBYTERIAN HOSPITAL

DIAGNOSIS AND TREATMENT OF CERTAIN OTOLARYNGOLOGIC CONDITIONS

Summary Case I—Acute mastoiditis with infection of deep seated pneumatic cells
Patient giving history of a discharging ear of five weeks duration examination—x-ray findings—bacteriologic report diagnosis operation eight weeks after onset—condition found at operation usual mastoid operation performed

Case II—Disturbance of equilibrium Patient having disturbance of equilibrium as the result of a blow on the temple one year before also partial

of examination of hearing and of vestibular mechanism suggest a lesion developing in the cerebellar pontine angle interfering with the function of the eighth nerve

Case IV—Squamous-cell carcinoma of the larynx A man aged sixty five giving a history of hoarseness coming on insidiously two years before two months before examination patient was operated on for a carcinoma of the large intestine examination revealed a tumor formation at the anterior commissure microscopic examination of removed growth showed it to be a squamous-cell carcinoma later the thickened tissue in the larynx was removed with the galvanocautery

Case V—Laryngeal papilloma A man of sixty years with loss of the speaking voice developing nine months before diagnosis—a benign papilloma of the larynx differentiation from a malignant growth and from tuberculosis methods of removing such growths—technic in present case prognosis

CASE I—ACUTE MASTOIDITIS WITH INFECTION OF DEEP SEATED PNEUMATIC CELLS

THE case is that of a man thirty six years of age who consulted me in April 1915 because of a discharging ear which had developed five weeks before For two weeks after the acute onset he suffered more or less from severe pains over the left side

of the head and neck. Since that time he had had very little discomfort, and was sent to me because of the persistence of rather profuse purulent discharge. There was no elevation of temperature, and the patient stated that he had been watching this himself every evening, but had not as yet discovered any thing above the normal.

We found, on examination, that aside from the purulent discharge the fundus of the canal was very much contracted, not as a distinct sinking however, of the upper posterior wall, which is so characteristic of some cases of mastoid abscess. None of the landmarks of the drum membrane could be detected. The mastoid was small in outline, there was no evidence of infiltration or edema over the mastoid region and only one or two points where the patient admitted having any more discomfort on deep pressure than on the opposite side.

The skiagraph which we had made disclosed a small mastoid shadow over all the pneumatic spaces, a rather suspicious shadow near the tip which might have been either the result of a softening or of a deep-seated cell filled with pus.

Bacteriologic examination showed staphylococci only.

The duration of the profuse discharge, together with the findings of the contracted canal, suggested very distinctly a type of mastoid disease which would have to be treated surgically. The patient, however, because he was not feeling ill did not have a rise of temperature, and was experiencing very little discomfort in the region of the ear was not inclined to accept the advice to have the mastoid cleaned out. This condition ran on for three weeks longer showing very little change during this time. One week after we had seen him he returned to the city and admitted that he had been having enough discomfort in the ear for several days to keep him away from business. It was not until the end of the eighth week after the onset of the ear trouble that distinct infiltration appeared over the region of the mastoid process. This was associated with a great deal of discomfort. The result was that the patient reported to us again and was then quite willing to accept our advice to go to the hospital and have the mastoid cleaned out.

A fistulous opening was found over the tip. The mastoid process itself was very small. A great deal of softening had already taken place in the bony tissue. After removal of the tip opening into the antrum and cleaning out of the remainder of the mastoid process pus was seen to be oozing up from a region in the bottom of the mastoid wound rather close to the external auditory canal and above the region of the tip of the mastoid. Using a curet in this region we opened into a large cell which because of its depth was recognized to be internal to the digastric groove. This cell lay in the region of the shadow which was shown in the skiagraph near the tip of the mastoid. The detection of this deep-seated abscess was facilitated by the presence of pus which oozed up in the bottom of the mastoid opening. The usual mastoid operation for an acute mastoiditis does not include the exploration of the bony substance internal to the digastric groove.

CASE II.—DISTURBANCE OF EQUILIBRIUM

The patient is a man forty-one years of age who consulted me in April 1917. He complained that he was unable to work in a factory where he had been employed for several years because of marked disturbances in equilibrium. This condition had followed an accident in the factory sustained about a year before he consulted me. He had been struck a blow on the right temple region which had rendered him unconscious for a short period. Since then he has been incapacitated for his work. Has suffered from rather severe headaches especially over the right side of head and occiput these headaches coming on in attacks two or three times a week.

His disturbance in equilibrium which seems to constitute his chief difficulty in carrying on his work consisted of a tendency to fall which appeared to be as much in one direction as in another. At times there seemed to be very little of this disturbance but at other times it became very much exaggerated. There has been no nausea connected with the attacks nor was I able to get a history of any distinct symptoms of vertigo. The patient states that he had been somewhat hard of hearing for

three years during which time he had suffered somewhat from tinnitus aurium. This disturbance in hearing he attributes to another accident, which he had sustained three years ago. The physician who referred the case to me believed that there was possibly some injury to the internal ear which accounted for his disturbances in equilibrium.

Examination disclosed nothing abnormal in the nose or throat. The drum membranes in both ears were rather sharply retracted. The functional examination of the hearing disclosed a moderate defect in the hearing about the same in both ears. Bone conduction was shortened the Rinné was positive and the defect in the hearing was more at the upper end of the scale for both the Galton whistle and the c^4 tuning forks. The characteristics of the defect in hearing were those of a degenerative process involving the internal ear and were apparently not the result of the tubotympanic catarrh which had caused the retraction of the drum membranes.

In examining the vestibular apparatus we noted that there was no spontaneous nystagmus. The spontaneous pointing tests showed a past pointing to the left for the right hand 1 to 2 inches and for the left hand 3 to 4 inches. After rotation the nystagmus appeared about normal twenty three seconds' duration to either side. The past pointing after rotation failed to give entirely normal responses. For example after rotating to the right instead of past pointing to the right both hands past pointed a few inches to the left. After rotating to the left we got the normal past pointing to the left for both the right and left hands. In making the Romberg test the characteristic symptom of falling came out very distinctly. When the patient would attempt to stand he would lurch now in one direction now in another, sometimes to the right sometimes to the left sometimes forward even with the eyes open. His falling presented none of the characteristics of the falling associated with disturbances of the vestibular mechanism but from the exaggerated character of the symptoms they suggested at once that it was the result of a neurosis.

The fact that a personal injury case was pending also gave

reason for suspecting a functional although not necessarily a conscious exaggeration of symptoms. It was quite clear that the patient had not sustained an injury to the internal ear which could account for vertigo.

Vertigo which follows an injury to the internal ear is the vertigo associated with a disturbance in equilibrium caused by the sudden destruction of the end-organs in one ear and the unbalance which this occasions. Such a vertigo is most severe when the injury occurs but gradually improves and long before a year elapses has entirely disappeared. The fact that the patient still has good bearing in both ears shows that there had been no injury to the internal ear which could have caused vertigo. Such an injury would necessarily produce total deafness in the affected ear.

I submitted this case to Dr. Thor Rothstein for a neurologic examination and append here his findings. Dr. Rothstein concurred in the conclusions I had reached, namely that the man was suffering from a functional neurosis.

Dr. Rothstein's Report — His pupils react to light and accommodation are equal. Eye grounds normal.

No paralysis in face, tongue or extremities.

Tendon reflexes in arms equal on both sides and lively. Patella reflexes lively equal on both sides. Achilles tendon reflexes also lively and equal. No Babinski reflex. No Gordon reflexes. No Oppenheim reflexes. Cremasteric reflexes equal and lively. Abdominal reflexes lively. Planter reflexes present but rather sluggish.

Sensation to pain is decreased on right leg, right half of tongue and right arm while it is normal in corresponding regions on the left side. On neck, face and arms — normal. No numbness but on

region and all around the scar where there exists cysts and hyperalgesia.

There is no tremor.

No ataxia in the hands or legs.

He answers slowly to questions.

CASE III.—VERTIGO CAUSED BY INTRACRANIAL DISEASE
PRESENTING THE MÉNIÈRE SYMPTOM-COMPLEX

Mr H age thirty occupation school teacher consulted me in May 1918 complaining of dizziness head noises and defective hearing His trouble developed about two years ago During this time the tinnitus restricted to the left ear has been continuous but shows a decided increase during the periods when the vertigo is present The hearing defect is noticed only in the left ear The annoyance from vertigo is his chief complaint. This is true for almost all the cases presenting the Ménière symptom-complex The vertigo comes only in distinct attacks In the intervals between the attacks he is practically free from any sensation of vertigo When the onset of the attack has been rapid he has been thrown to the ground He has often been kept in bed for two or more days because of the vertigo Nausea and vomiting has been frequent He states that during the past six months he has been able to work but about half of the time because of these attacks The patient has had no trouble from headache

In making an examination I found nothing abnormal about the nose or throat The drum membranes were quite normal except for a slight cloudiness

The functional examination of the hearing disclosed no defect whatever in the right ear In the left ear the whispered voice for both low and high pitched numbers (82 and 66) was heard at only 2 feet. The lower tone limit was somewhat elevated as was shown by testing with the C fork which vibrates but 64 times per second The upper tone limit tested with the Galton whistle was normal The c⁴ fork vibrating 2048 times per second was also normal The duration for bone conduction was distinctly shortened The forks when placed on the median line of the head were lateralized to the normal ear The Rinne reaction was positive

In analyzing these findings it seems quite clear that the defect in hearing cannot be the result of any obstructive process developing in the middle ear Here is a marked defect in hearing which has developed in a man thirty years of age in the space

of two years which is associated with a persistent tinnitus. The process has not been associated with any distinct evidence of tubal catarrh aside from a slight cloudiness of the membrana tympani which however is present in both ears and has in all probability nothing to do with the trouble causing the defect in the left ear. Considering the age of the patient and the manner of onset the only process which could produce this defect in hearing because of obstruction in the sound conducting mechanism is fixation of the stapes. The case however is certainly not one of fixation of the stapes because in this disease the prolongation of bone conduction together with a negative Rinne are present even before the defect becomes anywhere nearly as marked as in this case. The elevation of the lower tone limit is also much more marked for the degree of deafness than is found in this case. It seems quite clear thus far that the defect in hearing in this case is not due to an obstruction in the conducting mechanism.

The defect must then be due to some disturbance of the sound perceiving apparatus. The fact that vertigo has been a conspicuous symptom also indicates clearly an involvement of the internal ear mechanism. The most conspicuous finding in the defect in hearing caused by a degenerative process developing in the labyrinth is a defect at the upper part of the tone scale as shown in examining with the Galton whistle. This was conspicuously absent in this case although the other reactions especially the shortened bone conduction and the positive Rinne show that the case is one of nerve deafness as opposed to middle ear deafness.

Nerve deafness which is not caused by a degenerative process in the labyrinth must be due to some intracranial disease and the conclusion reached by an analysis of the examination of the hearing tests points to an intracranial cause for the trouble in this case.

Let us now make an examination of the vestibular mechanism in order to determine whether the disturbance in equilibrium the vertigo is caused by disease in the labyrinth or by some intracranial disease interfering with the normal function of the

vestibular mechanism. I think we are safe in asserting that vertigo when present is always due to some disturbance of the vestibular apparatus either because of disease in the labyrinth interfering with the function of the semicircular canals or because of some intracranial disease interfering with the central pathways of the vestibular nerve. The examination of the function of the vestibular mechanism is made by stimulation of the semicircular canals and noting the effect especially on the production of nystagmus and the effect on certain pointing tests. Alteration in the nystagmus may be due to depression of function caused either by disease in the labyrinth or by intracranial disease interfering with the vestibular nerve. On the other hand abnormal responses in the pointing tests are usually caused by an intracranial disease which interferes with the transmission of impulses from the end-organs in the semicircular canals.

In this case the most conspicuous result of the vestibular examination was abnormal pointing tests. When a person with a normal vestibular mechanism is rotated to the right the pointing tests show a deviation to the right and when he is rotated to the left there will be a past pointing to the left. In this case after rotation to the right the right hand did not past point at all whereas the left hand past pointed to the left instead of to the right as in a normal case. After rotation to the left this patient's hands both failed to past point.

The result of the examination of the vestibular mechanism in this case suggests an intracranial cause for the symptom of vertigo just as the analysis of the hearing tests suggest an intracranial disease as the cause of the defect in hearing. The diagnosis is some lesion developing in the cerebellar pontine angle interfering with the function of the eighth nerve.

CASE IV.—SQUAMOUS-CELL CARCINOMA OF THE LARYNX

The patient a man aged sixty five consulted me in April, 1918 because of hoarse voice which came on insidiously about two years before. At the end of one year the hoarseness he states was as bad as when he consulted me but after that he thought there was a distinct improvement for some time. He

has had no cough and has suffered no discomfort in the region of the throat. In the two years he has lost however 24 pounds in weight. This loss in weight could have been accounted for because of an abdominal condition which was operated at the Presbyterian Hospital two months before the patient consulted me. The abdominal condition proved to be carcinoma of the large intestine. A resection of a large part of the colon was undertaken by Dr. Bevan.

Examination of the patient disclosed nothing abnormal in the nasal or postnasal passages. The epiglottis was free. The movement of the vocal cord was not interfered with. The false



Fig. 51.—Squamous celled carcinoma of the larynx.

cords were not involved nor was there any alteration in the posterior wall of the larynx. Both vocal cords were rounded thickened with a rough surface covered with a yellowish mucopurulent secretion. At the anterior commissure was a tumor formation which could be seen below the vocal cords and which projected above about $\frac{1}{4}$ inch in diameter (Fig. 51).

The long duration of the trouble, the absence of fixation of the vocal cords, and of pain present a clinical picture of a chronic form of laryngeal tuberculosis rather than of a malignant growth in the larynx. We found no evidences of infiltration of the cervical lymphatics.

Under local anesthesia the growth from the anterior commissure was taken off and dropped immediately into Zenker's solution and turned over to Prof. Le Count for histologic examination. Prof. Le Count reports squamous-cell carcinoma. Under a local anesthesia infiltration with novocain Dr. Bevan split the larynx and with a galvanocautery destroyed the thickened tissue in the larynx May 7, 1918.

CASE V.—LARYNGEAL PAPILLOMA

The patient is a man sixty years of age who consulted me October 1, 1918.

His chief complaint is the loss of the speaking voice, a condition which developed gradually beginning last January. His voice is exceedingly rough and lacks entirely any musical qualities. The character of the voice is quite different from that which one notices in a case of paralysis of the vocal cords. The hoarseness is of a type which one only hears in connection with an ulceration or infiltration in the larynx itself. The patient has at no time suffered from sore throat and at no time has there been any pain connected with his trouble, not even pain on swallowing.

He states that the hoarseness began to develop after an attack of acute articular rheumatism. He has more or less desire to clear his larynx but has never been especially annoyed with coughing attacks. The patient is in good health. He feels no depression because of his throat trouble although he is somewhat anxious, fearing that it may be due to a malignant growth.

In examining the patient we find no infiltration of the cervical lymphatics. A very satisfactory view of the larynx is obtained by employing the laryngoscopic mirror. The first thing that one notices is that there is no fixation of the vocal cords. On phonation the two arytenoid cartilages approximate each other and on inspiration the cords are thrown apart allowing one to look into the trachea. The second thing that one notices is a diffuse congestion which involves all of the mucous membranes lining the larynx. There is a distinct diffuse infiltration of the *laryngeal mucous membranes*. From the right

side protrudes a new growth, which overhangs the right vocal cord. On inspiration this is thrown somewhat into the glottis, that is, into the opening between the cords. On phonation it lies above the approximated cords. The movement of the growth shows at once that it has a more or less pedicled base. The growth itself has a grayish color which is readily distinguished from the more congested appearance of the mucous membrane of the larynx. Its surface is not smooth; it has a distinct cauliflower appearance. The diffuse congestion and infiltration of the membranes of the larynx is such that one gets no glimpse of a normal vocal cord either on the right or on the left side. The right cord has lost entirely its white appearance and presents a red, rounded surface, not unlike the false cord.

The condition was clearly one of a chronic diffuse laryngitis, of which the patient has undoubtedly been a victim for many years. Superimposed on this condition has been the development of the neoplasm which took place since last January. No doubt was left after an examination regarding the nature of the new growth. It was clearly a benign affair. This was evidenced from various reasons. In the first place, a malignant growth, long before it attains this size, would have caused a fixation of the cord on the affected side. It is one of the characteristics of a cancer developing in the larynx that the movement of the vocal cord on the affected side is interfered with very early, and the patient exhibits a degree of hoarseness which is out of all proportion to the changes due to the apparent size of the new growth. In the second place, this patient has had no discomfort in the nature of pain or sore throat. In a cancer the pain is often a very conspicuous and early symptom. This pain is frequently present before there is any superficial ulceration, but it becomes much more marked, of course, when the cancer begins to ulcerate. The pain is increased during the act of swallowing and there is often a radiation of pain up toward the ear. This radiation of the pain in a malignant growth in the larynx is caused in the same way as the otalgia associated with a peritonsillar abscess, or which is so frequently seen after a tonsillectomy. Another finding which is characteristic of a

benign growth is the more or less pedicled character of the tumor. In a malignant growth the infiltration has a diffuse base which fuses imperceptibly into the surrounding tissue and without any distinct line of demarcation.

Sometimes in a tuberculous lesion of the larynx one finds a cauliflower like protuberance. This is especially true when the trouble develops on the interarytenoid space on the posterior wall of the larynx. A tubercular lesion involving the lateral wall of the larynx has a broad infiltrated base and is not pedicled.

One sees not infrequently a form of chronic laryngitis where there is a diffuse congestion and infiltration of the vocal cords with a rather circumscribed thickening just in front of the arytenoid cartilage involving one or both vocal cords. This condition is very readily aggravated by any acute cold. At such times the hoarseness is greatly increased. This is entirely a benign affair and is technically known as pachydermia of the larynx. When an ulcer is present one may question at first whether the condition may not be one of tuberculosis or even of cancer. The fact that there is no fixation of the cords speaks in favor of a benign condition.

The condition present in this case is one of papilloma and is a very common form of laryngeal new growth. It is seen more often in children than in adults where it is very often a diffuse growth which it is difficult for one to remove in its entirety. There is a great tendency for the papilloma to re-form necessitating operations year after year. The condition is one which may clear up spontaneously.

The removal of such a growth may be accomplished in several ways employing either the direct or the indirect method of approach. By the direct method we mean the use of instrumentation which will permit of a direct inspection of the larynx and the introduction of instruments into the larynx for the removal of the growth without the use of reflecting mirrors. By the indirect method we mean the introduction of instruments into the larynx by means of the image-reflecting mirror. The direct method has come more into vogue in recent years since the introduction of the suspension laryngoscopy. This requires a

general anesthesia and is frequently not an easy procedure to carry out. The indirect method is usually a much more simple procedure and is accomplished under local anesthesia. The direct method has a more general application and can be employed in the more difficult cases where the indirect method is unusually difficult.

In this particular case the problem was one of introducing an instrument into the larynx which would remove the growth in its entirety. It seemed that a snare would accomplish this more readily than any laryngeal forceps. The latter would mean taking the growth out in pieces and the bleeding under these circumstances would interfere very much with an effort to complete the removal of the growth at one sitting. It seemed that if a snare could be passed around the apparently somewhat pedicled growth it might be possible to remove the entire papilloma at once. There was one difficulty in this procedure that presented itself: this was the possibility of the rather large growth dropping into the trachea and causing an obstruction of the bronchus. This would not take place when using laryngeal forceps but it seemed a possible complication when using a snare. In order to guard against this accident we had planned to have the patient take a deep inspiration after the snare had once engaged the growth and then while the patient was making an effort to cough we would cause the snare to cut off the growth. The first time we tried to carry out the operation we did not succeed in getting the wire loop over the growth. After trying this for a short period we decided to let the patient rest up rather than pursue the manipulation which was bound to result in more or less irritation of the mucous membrane of the larynx. The patient was directed to return the next morning when the cocaineizing of the larynx was again carried out and we succeeded in placing the snare over the growth. It seemed possible that the tumor would adhere to the wire loop of the snare and be withdrawn with it but in order not to take the risk described above of allowing it to drop into the trachea the patient was directed to take a deep inspiration and during the act of coughing the growth was snared off (Fig. 52) and the instrument with

drawn. The tumor did not adhere to the instrument, but was spit out of the mouth immediately afterward. Apparently the act of coughing had assisted in preventing the growth from dropping into the trachea.

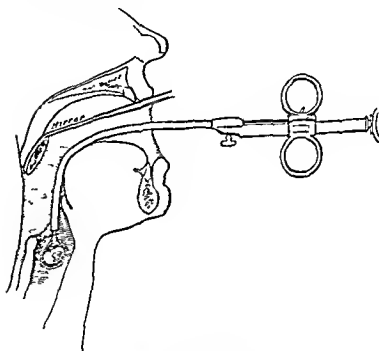


Fig. 52.—Growth snared off.

In this case we do not expect the patient to develop the normal voice, although there will probably be a very marked improvement. The diffuse infiltration of the larynx which was present before the papilloma developed there is a condition which he has had for a great many years and will probably persist.

CLINIC OF DR. EDWARD H. OCHSNER

AUGUSTANA HOSPITAL

THREE CASES OF SINUS DISEASE

Summary Case I.—Patient giving a history of long-standing nasal catarrh repeated operations on nose and antrum of no avail severe attack three months ago followed by a generalized arthritis present condition operative treatment—technic after history

Case II.—Antrum infection caused by a diseased upper molar tooth and followed by an acute frontal sinus infection operation—unusual abnormality found—frontal sinus opening into antrum instead of into nose

Case III.—An acute frontal sinus infection following influenza—treatment—after history

WE have for operation this morning three very interesting sinus cases

CASE I.—The first patient is a male, aged thirty six His mother died at the age of thirty five from chronic catarrh complicated by heart trouble His past history is negative with the exception of a chronic catarrh which has been present as long as he can remember He describes this catarrh as a weeping of the nose rather than a stopping up of the nostrils For years the nose has been very sensitive Fifteen years ago the condition was so severe that it resembled hay fever, causing him to blow his nose very frequently during the day for one year At that time he consulted a specialist who operated several times, removing growths from both nostrils The patient thinks the doctor called these growths polypa At the same time the doctor penetrated the nose into the antrum drawing out more than a thimbleful of pus Following these operations the patient moved from Buffalo N Y, to Washington D C, and in the warmer climate the catarrh seemed to improve, but he still continued to suffer from severe "head" colds His nose would run profusely for one or two days and then for many days afterward he would blow or spit out a great deal of yellowish green matter

About two years ago the colds became more severe, and he again consulted a rhinologist, who irrigated the nostrils two or three times a week for many weeks with only temporary relief. Three months ago he had a more severe cold than usual with grippy symptoms. This was diagnosed by one physician as catarrhal jaundice. A few weeks after getting out of bed his heels became sore, the soreness gradually spreading to feet, ankles, and knees. He had slight pyrexia at the onset. One week later the pain became so severe that he could scarcely walk. He then consulted an internist, who thought the arthritis was from the teeth. Two teeth were extracted without relief of symptoms. He was then referred to a rhinologist who opened the antrum through the nose, put the patient to bed, and gave 40 grains of aspirin daily. While taking the aspirin the pains improved but as soon as it was discontinued they returned.

The patient came under my care three days ago with practically every joint in the body involved—swollen, painful, and with marked limitation of motion. Temperature was 103° F and pulse ranged as high as 140. He gave a history of passing some pus from the right nostril and hawking considerable from the pharynx.

Blood examination showed 16,500 leukocytes, 2,700,000 erythrocytes, and 90 per cent. hemoglobin. Differential white count gave 84 per cent. neutrophils, 9 per cent. small lymphocytes, 6 per cent. large lymphocytes, and 1 per cent. eosinophils.

On transillumination there was a shadow over the right antrum. The other sinuses were clear. The heart was slightly enlarged with a systolic murmur over the apex.

It seems evident from this history and these findings that this patient is still suffering from an infection of the right antrum which has resulted in a panarthritis and septic endocarditis and it is further evident that the operations and treatments by way of the nose have been unable to cure the process in spite of the fact that they were performed by a number of our most prominent rhinologists. We have consequently advised a more radical operation, and will now proceed to do it.

We make an incision through the mucosa and periosteum in

the canine fossa of the right superior maxilla, reflect the periosteum with a periosteal elevator, and then with this $\frac{1}{2}$ inch carpenter's gouge make a circular opening $\frac{1}{2}$ inch in diameter into the antrum. No free pus appears but on careful examination we find the antrum lined with a velvety grayish yellow membrane, which is firmly adherent to the bone. We scrape this away with a sharp curet and rub it off with a piece of gauze placed over the end of the curet. We now break down the inner



Fig. 53 — Method of draining maxillary and frontal sinus

wall of the antrum insert a ligature carrier, and draw through a Number 12 soft rubber catheter letting one end project through the nose and bringing the other end out through the opening in the antrum and then sewing the ends together with a braided silk stitch as illustrated in Fig. 53.

We now pack the antrum with iodoform gauze which has been soaked in Churchill's tincture of iodine being careful to pack it just tight enough to make pressure and encourage healthy granulations to take the place of the pyogenic membrane, and yet not

tight enough to cause pain. We will leave this packing in place from three to six days, depending upon the tolerance of the patient to the pressure. At the end of this time we will remove it and begin irrigating the nose with nascent chlorine solutions.

This is one of the few instances in which I still use irrigation. I practically discontinued irrigations of all kinds twenty four years ago as the result of a rather interesting experience which I had at that time.

I was resident surgeon at the Cook County Hospital and in one of the changes of service there came under my care a little seven year-old lad who some three years previous had had an empyema of the pleura. In the intervening three years he had had innumerable operations and practically daily irrigations. It occurred to me that having had so much irrigation, a change might be desirable. I consequently stopped irrigating and within two weeks he was entirely healed. Since that time I have never irrigated an empyema of the pleura and never had a primary case of empyema of the pleura need a secondary operation, and have practically stopped all irrigations where the tissues can fall together and have found this practice to greatly favor healing. The only exception I make is in empyema located in an incompressible cavity such as empyema of the antrum or the frontal sinus. In these instances I have found irrigations of value.

In this case we select a chlorine solution because both from the appearance of the pyogenic membrane and the history of the patient I am fully convinced that the major infective agent in this case is the *Bacillus mucosus* which we know is a semi-saprophytic organism and it has been rather fully demonstrated that the nascent chlorine solutions can be looked upon as more or less specific in all saprophytic and semisaprophytic infections.

Note—The patient made a slow but gradual recovery. Pyrexia disappeared in the course of about three weeks, tachycardia in six weeks, discharge from nose and antrum in ten weeks and the antrum closed in eleven weeks. On his discharge from the hospital eleven weeks after operation the joint symptoms had almost entirely disappeared as had also the mitral murmur.

CASE II—The second patient this morning is a man, aged twenty nine, a shoe salesman, living in Mississippi, with negative family and previous histories

Seventeen months ago he began to have trouble with the first left upper molar. A cavity developed from which pus discharged into the mouth from time to time. Eleven months ago an alveolar abscess developed on this tooth and shortly after severe pain developed over the left antrum, and considerable mucopurulent material began dropping into the pharynx. At this time the tooth was extracted, but the trouble did not clear up. Nine months ago he had the antrum treated through a trephine opening in the root space of the extracted first left upper molar tooth. The treatment failed to relieve either the discharge of pus from the pharynx or the pain in the antrum. Two months later the antrum was opened through the left nostril following which the pain became somewhat better, but never entirely disappeared. Two weeks ago he had severe pain and a feeling of pressure over the left frontal sinus accompanied by some pyrexia.

Physical examination was negative except for tenderness over the left frontal sinus, an unusually high palatal arch, and some pus in the left pharynx. The left antrum and left frontal sinus were darker than the right on transillumination. Vacuum cup applied in both nostrils after cocaineization brought no pus.

Operation—In this case we will make an incision over the left frontal sinus cutting directly through the area of the eye brow. We will extend the incision from its inner angle to a little more than halfway to the outer end of the eyebrow, cutting through the skin and periosteum. The periosteum is now reflected and the frontal sinus opened with a $\frac{1}{2}$ inch gouge. Immediately on opening the frontal sinus a thick creamy pus wells out with considerable pressure. We remove the pus by packing in strips of gauze. When the pus is removed we pack the cavity tight with a piece of gauze saturated with tincture of iodine. We are careful to treat the edges of the cut bone with the iodine in order to close the openings which are normally found in the diploe. The purpose of this is to prevent the infection from

spreading along the diploe I have seen a number of cases in which this precaution was not taken develop periosteal abscesses at a considerable distance from the frontal sinus operation. In fact I recall one case that developed numerous periosteal abscesses

We now take an eye probe bend it slightly and pass it through the *infundibulum* into the nose. We now introduce the little finger into the left nostril as a guide in order to locate the lower end of the probe so that we may grasp it with an artery forceps. We are unable to find the lower end of the probe in spite of the fact that it has been pushed through the *infundibulum* as far as it would go and should rest on the floor of the nose. It is evident that we have here a very unusual abnormality a frontal sinus opening into the antrum instead of into the nose. This may explain why the violent frontal sinus infection followed the antrum infection and also why the vacuum cup brought no pus.

In recent years I have been operating less and less frequently on frontal sinus infections. The great majority of cases I have been able to relieve permanently by cocainizing the nasal mucous membrane and applying the vacuum cup about twice a week. This usually draws out the pus from the frontal sinus and results in a cure as shown by the disappearance of the pyrexia and pain of the pus from the fauces and the nose and of the shadow on transillumination.

We will now incise the mucosa over the canine fossa of the left maxilla and after reflecting the periosteum, open the antrum with the same gouge making the opening fully $\frac{1}{2}$ inch in diameter. We now insert the little finger into this opening and here in the antrum we find the lower end of the probe which passes from the frontal sinus through the *infundibulum* into the antrum as shown in Fig 54.

Into the eye of the eye-probe we thread this strong braided silk (Fig 55) which has a number of knots of various sizes and we draw it back and forth until the infundibular opening will freely admit the passage of a No 12 French catheter. We now break down the bony septum between the antrum and the nose

and draw through a No 16 rubber catheter, passing out through the left nostril and through the outer opening of the antrum, and then suture these two ends together, as illustrated in Fig 56. We insert a small rubber drainage-tube into the frontal sinus,

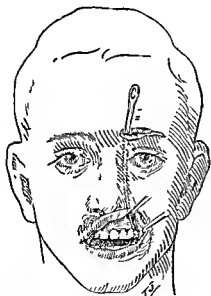


Fig 54—Illustrating abnormality Probe passing through infundibulum into antrum



Fig 55—Knotted silk for enlarging the infundibulum.

as also illustrated in Fig 56, and then pack both the antrum and the frontal sinus with gauze saturated with tincture of iodine and close both angles of the supra-orbital wound. We apply a wet dressing of saturated boric acid in water over the supra-orbital wound because this pus looks like staphylococcus pus, and we

have demonstrated repeatedly that saturated solution of boric acid is a true specific for this infection. In this case we do not add alcohol to our solution, nor do we use a protective as either of these might cause serious damage to the eye. The packing will be left in two or three days. After removal the wounds will be irrigated daily with boric acid solution until the infection has entirely cleared up.

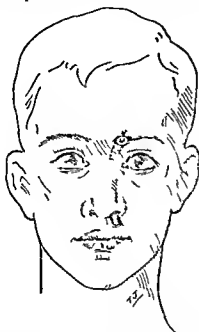


Fig. 56—Illustrates method of draining frontal sinuses

CASE III—The third case is an acute one. The patient a boy of sixteen, was taken ill nineteen days ago with a severe attack of influenza. After seven days the temperature became normal. Five days ago he had a sudden severe pain over the left temple, extending into the eye and upward into the forehead with a recurrence of his pyrexia which has been around 102° F until the present time.

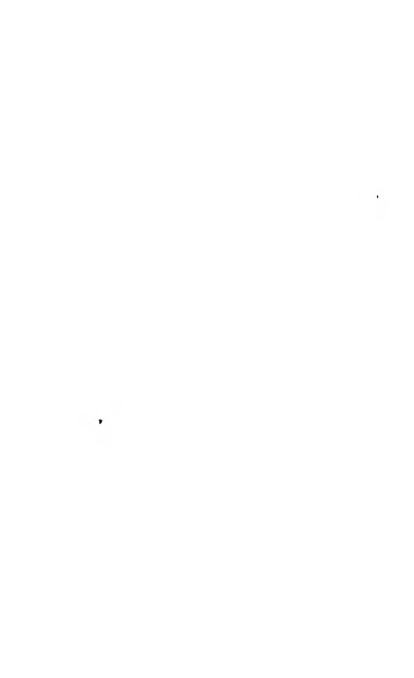
On examination, we find a rather anemic boy with severe

pain and marked tenderness over the left frontal sinus and a drooping of the left eyelid. There is complete dulness over the left frontal sinus on transillumination.

After shaving which has been delayed because of severe tenderness of the part, we make an incision through the area of the upper eyebrow, beginning at the inner end and extending a little beyond the median line reflecting the skin and periosteum and opening the frontal sinus with this $\frac{1}{2}$ inch gouge. Immediately a thick creamy pus is released under high pressure. We will sponge out this pus and pack the cavity and cut surfaces of the bone with gauze soaked in Churchill's tincture of iodine.

On careful exploration we find that the abscess has ruptured into the right frontal sinus and also through the orbital plate of the frontal bone into the retro-orbital space. We now pass an eye probe through the infundibulum into the nose and out through the left nostril. By means of this knotted braided silk threaded on the eye-probe the infundibulum is enlarged until a No. 12 French soft rubber catheter can be readily drawn through. The upper end of the catheter is fastened to the skin incision and the lower end is permitted to project through the nostril as shown in Fig. 56. We will now pack the wound with gauze saturated with iodine. After closing the inner and outer angles of the wound wet boric acid dressings will be applied.

Note—Careful microscopic examination of the pus showed it to be a mixture of *Diplococcus pneumoniae* and *Micrococcus catarrhalis*. The gauze packing was removed on the third day, the upper end of the rubber catheter cut off flush with the wound on the fourth day, and gradually withdrawn through the nostril until completely removed on the eighth day. All discharge of pus had ceased by the twelfth day, and with the exception of a slight superficial defect the wound closed by the fourteenth day.



CLINIC OF DR EDWARD LOUIS MOORHEAD

MERCY HOSPITAL

REPORT OF FOUR CASES

Summary Case I—Gynecomazia or gynecomastia A boy of eleven complaining of swelling of right breast—examination types of gynecomazia treatment bibliography

Case II—Intraligamentous uterine fibroid complicated by pregnancy Patient giving history of uterine hemorrhages beginning four and one half months after marriage examination operation—findings examination of specimen after history

Case III—Compound fracture of the ankle joint with forward & lateral displacement of the foot Patient admitted to hospital with injury to left foot immediate treatment of fractures operation—prognosis

Case IV—Impacted intra-articular fracture of neck of femur Patient giving a history of having fractured her femur one year ago—treatment at that time—results present condition—removal of screws treatment of impacted intra articular fractures of the neck of the femur prognosis in present case

CASE I—GYNECOMAZIA OR GYNECOMASTIA

AMONG the rarer anomalies of the breast occurring in the male is the condition known as gynecomazia or gynecomastia. According to the accepted definition it is the development upon a male of mammae resembling those of a female, either with or without the secretion of milk.

Our patient a schoolboy eleven years of age, born in the United States and of Italian descent enters the hospital for relief of the complaint—swelling of the right breast. The child does not know the exact duration of his present trouble, but thinks that it is of some months' standing. It began as a slight enlargement of the right breast which has gradually increased in size. It has never been painful and is tender only on firm pressure. There is no history of injury inflammation or discharge from the nipple. The axillary lymph glands on the right side have shown no enlargement or tenderness.

The past history is negative except for the usual diseases of childhood. Mentally the boy appears normal and is in the fifth grade at school. The family history is negative. Two other boys, older than this one, have been born to these parents and do not show the anomaly.

Upon physical examination the patient is seen to be a fairly well nourished boy, apparently about the age stated and not acutely ill. General examination is negative except for the following condition. There is a marked enlargement of the right breast. This is painless and non-inflammatory. As you see, the breast appears about as large as that of a girl eighteen years of age. It is freely movable and not adherent to the underlying structures. It projects about $5\frac{1}{2}$ cm. and the horizontal diameter is 10 cm. The nipple protrudes but slightly beyond the summit. The skin over the breast is freely movable and the substructure is firm and lobulated and has the feel of an adult woman's breast. There are no enlarged right axillary lymph glands. There is no corresponding enlargement of the left breast. Both testicles are present and in the scrotum. There are no anomalies of the external genitalia. There is no enlargement of the thyroid nor any evidence of hyperthyroidism. Blood count is normal. examination of urine negative and the Wassermann test is reported negative (Fig 57).

This condition has been long recognized. Aristotle¹ says he has seen men with mammae which were as well developed as those of a woman and Paulus Aegineta recognized the fact in the ancient Greeks. To Bedor a marine surgeon² we owe the first scientific exposition of this subject.

Distinction must be made between cases of real glandular hypertrophy and those in which there is a heaping up of fat and fibrous tissue. Probably the best classification of the condition is that given by Gruger of Petrograd³

- 1 That in which the male generative organs are normal
- 2 In which they are deformed
- 3 In which the anomaly is spurious the breast being a mass of fat or a new growth.

To those cases falling into the first class we may apply

the term 'essential gynecomazia'. Into the second class we must put all cases of testicular atrophy whether congenital or acquired. The latter condition may be the sequel of an orchitis due to trauma, mumps, syphilis, or tuberculosis.

Gynecomazia may be unilateral or bilateral. The condition seldom manifests itself until adolescent or even adult life. The essential type is probably prenatal in origin and shows a tendency to occur in members of the same family. Cases are on record of the occurrence of the condition in both father and son.

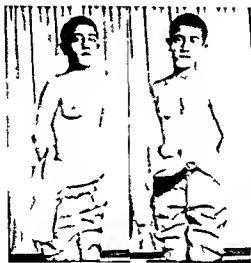


Fig. 57.—Gynecomastia right side boy eleven years old. T. o. v. e. s.

Secretion of milk may or may not occur. The breast usually reaches a definite size and then growth ceases. The condition has been known to disappear spontaneously.

No treatment is necessary unless the condition gives rise to deformity or becomes troublesome. In this boy it will occasion some embarrassment when he goes in swimming or engages in athletics. It has been known to become troublesome during exercise on parallel bars. In mild cases a compression bandage with the internal administration of potassium iodid

is indicated in the acquired forms organotherapy has been suggested, in the syphilitic the treatment is that of syphilis. We shall treat this boy expectantly, using the compression bandage and small doses of potassium iodid. From time to time we shall have him return to the hospital for observation.

BIBLIOGRAPHY

- 1 Aristotle Opera Omnia. Edit. Animal. Lib. iii. ch. xx.
- 2 Bulletin de la Société d'Anthropologie de Paris 1886 483.
- 3 British Medical Journal London 1886 ii 172.

CASE II—INTRALIGAMENTOUS UTERINE FIBROID COMPLICATED BY PREGNANCY

This patient Mrs Q. was referred to me with a history of having had excessive hemorrhages from the uterus for the past six weeks which her physician has tried in vain to stop. She is forty-two years of age and has always enjoyed good health up to this time. She is the mother of two children by a former marriage one sixteen years and the other twelve years of age. Her menstrual functions have always been regular and she has suffered no special discomfort at those times.

After being a widow for eight years she remarried six months ago. Nothing unusual occurred until six weeks ago when she began having uterine hemorrhages at first slight but gradually increasing in quantity and duration. There has been great difficulty in obtaining a bowel movement and a feeling of pressure or weight in the lower abdomen.

The patient is fairly well nourished but rather pale from loss of blood. Heart and lungs are negative. Abdomen. Upon external examination a mass is felt in the median line extending up almost to the umbilicus. Upon bimanual examination this mass is found to fill the entire basin of the pelvis extending low down in the culdesac and more to the left side. The vaginal is very much narrowed by the encroachment of the mass and the cervix cannot be outlined although high up behind the symphysis pubis the external uterine os can be determined. The mass is not movable and it is of firm consistency and hard except in

the center of the upper anterior part, which is apparently a little softer to the touch.

portion covered by peritoneum



Uterus divided, showing the tumor in situ. Arrows indicate point where peritoneum was divided for the enucleation of tumor.

This case presents two or three points to be considered in its diagnosis and treatment. What is the probable nature of the

growth? Is it removable? Is it complicated? Our diagnosis is an intraligamentous uterine fibroid, possibly complicated by pregnancy. As for treatment, there is but one procedure, and that is operation. The patient cannot survive unless the hemorrhages are stopped, and I am satisfied that all means outside of operation have been tried and failed.

The patient has been prepared for operation and I will now make the usual right rectus incision between the umbilicus and

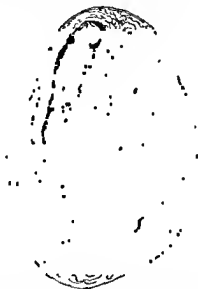


Fig. 59.—Sagittal section of uterus and tumor mass, showing the involvement of the posterior wall of the uterus and cervix.

the pubes. Upon opening the abdomen and passing the left hand down upon this mass I find that it fills the pelvic outlet and extends laterally into the broad ligaments, more on the left than on the right side. The upper anterior portion is softer and is probably the anterior uterine wall. In order to remove this growth it will be necessary to split the broad ligaments of both sides on their upper surface, making an anterior and a posterior flap. In this way the growth can be enucleated and the de-

nuded surfaces covered over by suturing the edges of the divided broad ligaments. The enucleation is rather difficult, great care being taken to avoid injury to ureters, bladder, and rectum, but finally the entire mass is removed. All bleeding points are now ligated and the abdomen closed in the usual manner.

Let us now examine the specimen. The right tube and ovary are present. The left tube is present, but the ovary has

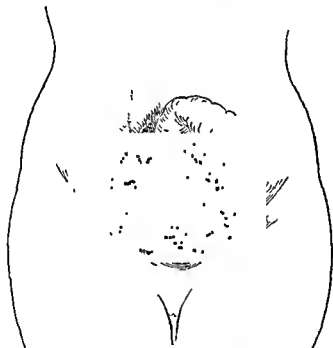


Fig. 60.—View of tumor *in situ* upon opening the abdomen previous to enucleation.

become detached during the manipulations, and we have it here separately. Upon opening the soft part on the superior anterior surface the uterine cavity is exposed, and a fetus of about nine weeks is found. You will notice that only this upper part is covered by peritoneum, the lower three-fourths of the mass being devoid of peritoneal covering, as it was enucleated from between the folds of the broad ligament. The

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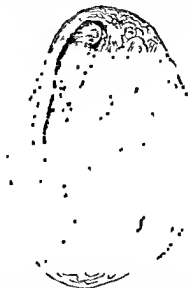


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them in position. Through and through drainage is established, no attempt being made to close the soft parts at this time.



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The muscles of the posterior aspect of the leg have been severed.

A retentive dressing fenestrated so that the wound may be irrigated is now applied and the patient returned to bed. He will be watched closely.

posterior uterine wall is part of the tumor mass. I think you will all agree that the procedure followed in this case was the correct one.

Note—Patient made an uneventful recovery, leaving the hospital at the end of three weeks.

CASE III.—COMPOUND FRACTURE OF THE ANKLE-JOINT WITH FORWARD DISLOCATION OF THE FOOT

Mr F S, age thirty-eight years, was admitted to Mercy Hospital yesterday afternoon with the history of having fallen from the top of a pile of wood about 12 feet high. He struck upon the ball of his left foot and was unable to arise. Upon admission to the hospital the wound was cleansed, a temporary retentive dressing applied, and the usual prophylactic antitetanic serum given.

Upon examining the skiagraphs we find that there is a fracture of the fibula about 4 inches from the lower end, with an outward displacement of the lower fragment. The internal malleolus and articular end of the tibia are fractured and the tibia is protruding through the soft parts to the side and behind the os calcis, with the foot displaced forward.

We have then to deal with a compound fracture at the ankle-joint with a forward dislocation of the foot. This is an unusual injury, and was caused, no doubt, by the extreme dorsal flexion of the foot upon the ankle, produced by the weight of the body acting as a leverage upon the ball of the foot.

The patient is now anesthetized, the temporary dressing will be removed, and the field of operation cleansed as thoroughly as possible. The soft parts are very badly lacerated. There is very little bleeding notwithstanding no constrictor has been applied. Apparently there is no circulation in the foot. While I do not think there is any prospect of saving this foot, and probably primary amputation would be the best, I shall dress it in position and watch it for a few days. There is no difficulty in reducing the dislocation as the soft tissues on the posterior aspect of the leg have been torn through, but it will be necessary to apply a Lane plate to the tibia and astragalus in order to retain

can be saved, all means must be exhausted to do so. The prognosis however is bad because of the severe injury to the blood vessels. These cases usually result in amputation.

CASE IV—IMPACTED INTRA ARTICULAR FRACTURE OF NECK OF FEMUR

Mrs. C gives the following history. She is sixty-two years of age, married, and the mother of six children. She has always enjoyed good health until one year ago. At that time, while engaged in doing her family washing, she slipped on a clothes stick and fell upon her left hip. There was immediate and complete loss of function. A physician was called who made a diagnosis of a rupture of the ligaments of the hip joint and prescribed the use of liniments. She remained at home for two weeks and was then removed to a hospital. She states that an extension was applied to the limb for about one week, and then she was informed the bone was fractured and that it would be necessary to operate upon the hip in order to effect a cure. She gave her consent to this and the operation was performed about three weeks from the date of receiving the injury. Two screws were inserted to hold the fragments in position. I want you to remember this point regarding the time intervening between the date of injury and operation, as I may refer to it later. After remaining in the hospital for six weeks she was removed to her home where she remained in bed for about four months. At this time she was placed in a chair and attempts were made to use the limb. There was constant pain, more or less severe in the hip, and after the efforts to use the limb a swelling appeared upon the outer side of the hip. This swelling has gradually increased in size and is quite painful to touch. She comes to us now about one year following the injury for relief from this pain and swelling and to ascertain if she will ever be able to use the limb.

Upon examination the left limb is found to be $2\frac{1}{2}$ inches shorter than the right one. There is eversion of the left foot. The motion at the hip joint is limited. On the outer side of the left hip there is a distinct swelling, more prominent at its

From the extent of the injury to the soft parts in this case there is another element besides sepsis which must be considered namely, a traumatic gangrene of the parts below the site of



Fig. 6'—Lateral view of compound fracture at the ankle-joint with forward displacement of the foot

injury. There is no apparent active circulation in the foot now but we shall wait and see what the outcome will be. If the foot

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CASE IV.—IMPACTED INTRA ARTICULAR FRACTURE OF NECK OF FEMUR

Mrs. C. gives the following history. She is sixty-two years of age, married, and the mother of six children. She has always enjoyed good health until one year ago. At that time while engaged in doing her family washing she slipped on a clothes stick and fell upon her left hip. There was immediate and complete loss of function. A physician was called who made a diagnosis of a rupture of the ligaments of the hip joint and prescribed the use of liniments. She remained at home for two weeks and was then removed to a hospital. She states that an extension was applied to the limb for about one week and then she was informed the bone was fractured and that it would be necessary to operate upon the hip in order to effect a cure. She gave her consent to this and the operation was performed about three weeks from the date of receiving the injury. Two screws were inserted to hold the fragments in position. I want you to remember this point regarding the time intervening between the date of injury and operation as I may refer to it later. After remaining in the hospital for six weeks she was removed to her home where she remained in bed for about four months. At this time she was placed in a chair and attempts were made to use the limb. There was constant pain more or less severe in the hip and after the efforts to use the limb a swelling appeared upon the outer side of the hip. This swelling has gradually increased in size and is quite painful to touch. She comes to us now about one year following the injury for relief from this pain and swelling and to ascertain if she will ever be able to use the limb.

Upon examination the left limb is found to be $2\frac{1}{2}$ inches shorter than the right one. There is eversion of the left foot. The motion at the hip joint is limited. On the outer side of the left hip there is a distinct swelling more prominent at its

From the extent of the injury to the soft parts in this case there is another element besides sepsis which must be considered namely a traumatic gangrene of the parts below the site of



Fig. 62—Lateral view of compound fracture at the ankle joint with forward displacement of the foot

injury. There is no apparent active circulation in the foot now but we shall wait and see what the outcome will be. If the foot

rest in bed we will see how much use the patient has of the limb and determine whether any further procedure is necessary.

Examine closely the skiagraph with the screws in position and you will notice that the larger screw (which is 5 inches in length) passed not only through the greater trochanter and the head of the femur but that it also passed through the pelvic bone. Also notice that the femur has been carried upward and



Fig. 64. Impacted intra articular fracture of neck of femur. View taken at time patient was admitted to my service for relief of swelling on side produced by the screws.

outward by the position in which the screws were applied, thus accounting in a measure for the great shortening of the limb. We are fortunate to have for comparison the skiagraph which was made of this hip joint previous to operation. The patient gave it to me that I might have a better understanding of her injury.

Examine the original skiagraph and tell me what would be your diagnosis and also your line of treatment. To me the skiagraph shows an impacted intra articular fracture of the neck

upper part and quite firm to the touch. By consulting the skiagraphs of the hip-joint which were made yesterday the swelling is found to be caused by two large screws which no doubt were placed there at the time of the operation.

The patient having been anesthetized and the field of operation prepared an incision is made over the most prominent

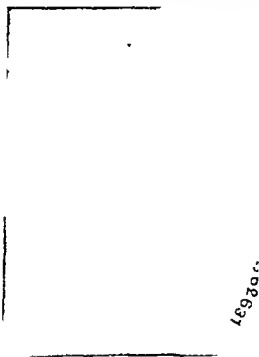


Fig. 63 — Impacted intra-articular fracture of neck of femur. View taken previous to operation.

part of the swelling and with the aid of a forceps and screw driver the screws which have backed out of their original places and are loose are now removed. There is apparently a fibrous union of the fracture and nothing further will be done at present. The wound will be closed without drainage. After a week of

CLINIC OF DR DANIEL A ORTH

ST MARY'S HOSPITAL

STRANGULATED FEMORAL HERNIA OPERATED UNDER SPINAL ANESTHESIA

Summary A strangulated femoral hernia in a woman of seventy-eight, operation under spinal anesthesia—advantages of this method, technic of operation history of spinal anesthesia—various drugs used for this purpose—apparatus—employment of preliminary narcotics—method of injection—site of puncture value of spinal anesthesia in emergency operations on patients suffering from influenza

WE have this morning a femoral hernia in a woman seventy-eight years of age which we shall operate under spinal anesthesia. She gives the following history:

Ten years ago she noticed a swelling in her left groin which became smaller at times but never entirely disappeared. It caused her no inconvenience until two days ago, when, after lifting her grandchild, a boy ten years of age who is sick with influenza the swelling suddenly became larger and she felt a severe pain in that region. In addition to this pain, which she described as similar to a toothache, there were severe colicky pains in the lower abdomen, cramp-like in character. She became sick at her stomach and vomited at frequent intervals. Her bowels have moved several times, and when given a soap suds enema a few minutes ago the nurse reported good results.

Soon after taking sick a doctor was called who tried to reduce the swelling, but was unsuccessful. He then gave her a prescription and told her to apply hot applications until he returned the next day. The following day he tried to reduce the swelling, but the pain was so great that she begged him to put her to sleep. He said he would have to have help, and that afternoon brought another doctor, put her to sleep with ether,

of the femur. This form of fracture rarely occurs except in old people and the cause is always direct violence—a fall or blow upon the hip. The appearance of the limb is very characteristic. It lies on its outer side everted and it is not possible to rotate it inward as it is when the bone is not impacted. Shortening of from $\frac{1}{2}$ to 1 inch occurs. Sometimes the patient can lift the limb from the bed. Crepitus and undue mobility of course are wanting while the amount of pain and the severity of the shock naturally vary with the nature of the accident.

The important point in these fractures is the impaction. If this can be preserved repair is fairly certain with the minimum of deformity. If it is broken down in the one case there will be only ligamentous union perhaps none at all in the other the deformity and the shortening will almost certainly be increased and the period of confinement much lengthened. The limb must be handled with the utmost care and any manipulation that is not absolutely necessary strictly avoided. For the sake of security the limb should be bandaged to a long splint or if there is any fear of congestion of the lungs fixed between sand bags with a weight of 2 or 3 pounds attached not for the purpose of keeping up extension, but merely to prevent muscular spasmic contraction. In three or four weeks a Thomas splint may be applied or the limb encased in a plaster cast and the patient allowed to get about on crutches with the foot suspended in a sling.

Fractures of the neck of the femur do not as a rule require operation in the early stage except in cases where the head is displaced downward and backward and the fractured ends can not be brought into apposition by manipulation.

From a study of the original skiagraph in this case the proper course to have been followed I believe would have been the application of a long splint or the use of sand bag and to have waited a reasonable time for union to take place before applying any operative measures. The position of the fractured bone is much better in the skiagraph previous to operation than in the one following operation. The patient probably will have some use of the limb but not as much as he would have had if the impacted fracture had not been disturbed.

that the solution is not so quickly absorbed and therefore lies longer in the spinal canal than in younger persons

We have used spinal anesthesia in over 700 cases during the last four years and have used it no doubt where others have been successful with local anesthesia viz hernias but we prefer this method for the following reasons

- 1 The operating time is a great deal shorter than with local thereby lessening the danger of sepsis from exposure of the wound

- 2 There is no pain when traction is made on the parietal peritoneum either by pulling on the sac or on the mesentery in cases where resection of the bowel is necessary in strangulated hernia relaxation is perfect again shortening the operating time

- 3 It causes a complete nerve block by blocking the transmission of impulses from the brain preventing surgical shock

- 4 Spinal anesthesia with apothecin or novocain when properly given is as safe as a local anesthesia with the same drugs

There are a great many nnt in favor of its use chiefly those who have had very little personal experience with the method and who still find it difficult to eradicate from their minds the profound impression of danger produced by the early mortality when cocain was used Dr Freeman Allen says he remembers when he considered spinal anesthesia an absurdly dangerous method now he considers it a remarkably safe one

In the patient about to be operated we have omitted the preliminary narcotic on account of her age—seventy-eight—and her extremely feeble condition The sister has just called my attention to the fact that the patient has a very weak pulse and that her skin is cold and clammy

The back has been aseptitized and the field for the lumbar puncture draped with sterile towels Our landmarks are identified by this lower towel and we palpate for the first available space above which is between the spinous processes of the third and fourth lumbar vertebrae To aid us an assistant holds the patient's legs and head in such a way that the back is bent to

and again tried to reduce same, but was unsuccessful. She was admitted to the hospital two hours ago.

Physical Examination—The patient is a poorly nourished woman with an anxious facial expression and lips of a bluish, livid color.

Head, eyes, ears, nose, and throat are negative.

Mouth—The tongue is coated with a grayish fur. She has only a few teeth, and there is slight pyorrhea.

Heart—The apex impulse is felt in the sixth interspace. The action is irregular and the sounds are of poor quality. There are faint systolic murmurs at the apex and in the aortic area. Pulse is rapid, thready, and compressible.

Abdomen—Level with tenderness over entire abdomen. There is a tumor about the size of an orange in the femoral region and extending above Poupart's ligament. This tumor is flat on percussion, very tender, and feels like indurated masses of omentum.

Extremities—Tremor of hands, knee-jerks sluggish, no edema or varicosities.

Diagnosis—Strangulated femoral hernia.

From the physical findings of the mass we can conclude that this is a strangulation of the omentum alone, whereas if it were intestine this mass would be rounded, smooth, tense and elastic. Although these patients vomit, the bowels continue to move, but we do not generally have the condition of shock present in this case. It is possible that besides the omentum we may have a strangulated bowel and that the tympanic note usually obtainable upon percussion is obscured by the omentum, or the bowel may have been empty and contained no gas at the time of strangulation. I think in this case the shock can be accounted for from the history of the manipulations which were repeated under ether anesthesia.

We shall operate on this patient under spinal anesthesia. It is just in these cases where spinal anesthesia is most needed that it is best borne. Thus, it is borne better by old or weak persons than by strong robust individuals, who can better stand ether anesthesia. The reason for this it is thought, is

after seven minutes from the time our field was prepared we are ready to operate

We make our incision over the center of the tumor parallel to Poupart's ligament so as to give access to the inguinal canal if such a step is required. We cut through the skin and superficial fascia and find the sac embedded in a firm layer of fat. We free the sac from its surroundings by blunt dissection open it and find that it contains only omentum which is quite adherent to the sac and inflamed. In loosening the adhesions the omentum was badly damaged which will necessitate its removal. We are obliged to cut the ring to liberate it. It is pulled down and we place our ligatures above the portion which was contained in the sac cut the omentum beyond the ligatures leaving enough to prevent slipping. We further separate the sac from its surroundings by blunt dissection with gauze pull same down out of the canal as far as possible without tearing it loose. Transfix the sac with catgut and remove that portion beyond the ligature again leaving enough tissue outside of the ligature to prevent slipping. This allows the stump to disappear into the peritoneal cavity. The ring is repaired with a few catgut stitches to restore it as nearly as possible to its original condition and then close the external wound after removing these pieces of fat in the cavity formed by the removal of the sac with a piece of moist gauze. We do not tamper with the ring any further than this. Professor A. J. Ochsner our Surgeon in Chief has shown that this is sufficient because it is based on the principle that it is practically impossible to keep a circular opening in any part of the body from closing spontaneously unless it be lined with a mucous or serous membrane and that when once deprived of its serous lining by removal of the hernial sac this ring contracts and closes very rapidly. Thus completes the operation. The only sound the patient emitted during the operation was when the sister injected 1 grain of caffeine citrate into her arm.

I would like to take this opportunity to say a few words regarding spinal anesthesia. Spinal anesthesia had its beginning with the experiments of Dr. J. Leonard Corning which were

make the vertebræ prominent and increase the space between these lumbar spinal processes. We introduce our needle about $\frac{1}{2}$ inch outside the middle line and not in the middle on account of the resistance offered by the strong median ligaments further more we avoid the extradural plexus of veins which lie in the median line. With my left hand I place the ball of my thumb against the lower border of the vertebra above, locate the point of puncture with the tip of the thumb and with my right hand insert the needle inward and forward until the resistance of the ligamentum subflavum is felt, when this resistance is overcome we withdraw our stylet. The point of the needle is now in loose extradural tissue and we push same forward a little at a time until we pass through the dura, and now you see the escape of the cerebrospinal fluid. It escapes in rapid drops which is essential for a successful anesthesia. No blood beyond 2 or 3 initial drops should come away through the needle before the appearance of the spinal fluid. When you get only blood and this does not promptly give way to spinal fluid you are probably in the extradural plexus of veins, in which case you withdraw your needle entirely and re-enter at some other available space otherwise you will inject into the plexus. We have withdrawn 3 c.c. of spinal fluid which equals the amount of solution to be injected this is put aside. We now withdraw another 4 c.c. and add this to our solution in this sterile beaker draw the whole amount 7 c.c. into our syringe and inject very slowly. After the injection the needle is withdrawn with a quick jerk and the puncture sealed with cotton and collodion. As soon as this is done we place the patient on her back and asepticize the field of operation. By the time this is done we generally have anesthesia in the perineum thighs and legs which is the case here you see she makes no sound when I pinch her with these towel-clips. From the thighs to the umbilicus we have to wait from five to ten minutes before the skin muscle and fascia is anesthetized when apothecin is used but when novocain is injected the anesthesia generally sets in and proceeds more rapidly. She makes no objection when we place these clips on the lower towels through the skin, but does higher up. Now

- 2 Recovery from toxic doses is extraordinarily prompt
- 3 It has very little action on the motor cells thereby lessening the dangers of motor paralysis
- 4 It stands boiling without decomposition
- 5 It is absolutely free from irritating action
- 6 It is physiologically compatible with adrenalin preparations

Since the war novocain was not obtainable, but still having a supply of old tablets containing synthetic novocain and suprarenin, we continued to use the same until we were forced to stop on account of toxic symptoms such as nausea vomiting, faintness, dyspnea sweating rapid feeble pulse, pallor, etc. This we attributed to the fact that the suprarenin had lost its effect on account of the age of the tablet, allowing too rapid absorption of novocain producing toxic symptoms. We also noticed that the anesthesia was fleeting, only lasting a very short time, which is characteristic of novocain when used alone. Recovery in all of our cases in which these toxic symptoms appeared was very prompt after giving them 1 ounce of whisky or a hypodermic of caffeine citrate (grain $\frac{1}{2}$), but in persons with poorly compensated valvular lesions who have no reserve fund of cardiac strength to draw upon death may be the result.

We now use apothecin manufactured by Parke Davis & Co, and find that besides the advantages named under 3, 4, 5, and 6 it has the great advantage of being non toxic, is slowly absorbed, and therefore can be used without adrenalin preparations. The anesthetic is lasting and in not a single case did we notice any toxic symptoms.

Apothecin is conveniently supplied in tablet form, each tablet containing $1\frac{1}{4}$ grains. These tablets can be depended upon in every way with the exception of their sterility, inasmuch as the dry substance cannot be sterilized it is necessary to sterilize the solutions made from these tablets before use. These tablets will stand continuous boiling without decomposition.

Our solutions are prepared as follows. An ordinary test-tube, cork to stopper and beaker, are boiled for fifteen minutes

published in the New York Medical Journal October 31 1885. He made several successful experiments with cocaine but his method did not meet with favor and was accordingly dropped until taken up some years later by Bier. He also used cocaine practising on himself his assistant and 6 patients. In all the cases anesthesia was produced in the legs and with the larger doses up to the navel. In his article in the *Deutsch. Zeitschr. f. Chir.* 1899 in which he reported the above cases he urges great care in the use of the method on account of the dangerous effect of the drug stating however that the time would come with the development of chemistry when a drug applicable to spinal anesthesia would be found. In 1905 at the German Surgical Congress Bier called attention to the use of stovain discovered by Fournneau in 1904 which together with the addition of one of the suprarenal preparations lessened the dangers attending its use. He expressed the opinion that spinal anesthesia though not yet perfected could be recommended for clinical use. The lumbar puncture of Quincke (1891) was of great importance for further progress it having been established as a diagnostic and therapeutic method the further steps toward spinal anesthesia were easier. Today it is used in France Italy Germany and by many of our surgeons in operations below the costal arch where a general anesthesia is contra indicated. Dr Kellogg Speed only recently reported nearly a hundred amputations of the lower extremities in war surgery in which he used stovain. He reports that each and every one was perfectly anesthetized and that the anesthetic was very satisfactory. Professor Bastianelli of Rome whom I recently had the pleasure of meeting at Professor A. J. Ochsner's clinic at the Augustana Hospital used novocain for spinal anesthesia until the supply became exhausted. He found it very satisfactory in selected cases.

Besides stovain and novocain alypin and tropacocain have been introduced but novocain has been generally adopted for the following reasons:

- 1 It is seven times less toxic than cocaine when combined with adrenalin preparations.

it escapes extradurally, again causing failure. The needle and syringe are boiled in plain water for fifteen minutes, then rinsed in freshly distilled water, because it is free of those invisible particles of foreign matter which we believe are the cause of the postanesthetic headaches, a much dreaded feature. Since using the apothecin our headaches are very slight, and in the majority of cases absent altogether.

Preliminary Narcotics—We recognize the advisability of employing preliminary narcotics for the following reasons:

- (a) The patient comes into the operating room without fear.
- (b) It makes him less susceptible to any possible pain contingent on spinal puncture.
- (c) A more profound anesthesia is obtained with a smaller amount of apothecin.
- (d) It acts as a guide to the amount of apothecin required.

In persons over thirty years of age we employ morphin sulphate (grain $\frac{1}{4}$) and scopolamin (grain $\frac{1}{16}$), divided into three doses. The first is given one and a half hours before operation, the second, one hour before, and the third, one half hour before operation. It is rarely necessary to give a fourth dose, and in a great many the desired effect is produced by two doses. In persons below thirty years of age we omit the scopolamin and give the morphin alone, the entire amount (grain $\frac{1}{4}$) being given one half hour before operation.

In persons with marked respiratory depression, renal trouble, toxemia, etc., we omit the narcotic injections. In children we give sodium bromid, the dose of which is regulated according to age.

Preliminary preparation such as diet catharsis, etc., is unnecessary except in operations on the stomach and intestines. This makes it especially valuable in emergency surgery, the postoperative phenomena being the same as in those who have been carefully prepared.

Before entering the operating room the patient is blindfolded and the ears are plugged with cotton to exclude all external stimuli. The patient is placed on the right or left side,

in water free from bicarbonate of soda. We specify this because the apothecium is chemically affected by alkalis. These utensils are then carefully rinsed in freshly distilled water. We now place about 3 c.c. of freshly distilled water in the test tube, add the tablet, and then boil for five minutes. The solution is then poured into the beaker from which it is drawn into the syringe either with or without spinal fluid. The specific gravity is approximately that of the spinal fluid—1009.

Apparatus—We prefer a glass record syringe graduated to 10 c.c. as shown in Fig. 65. This needle is made of iridium

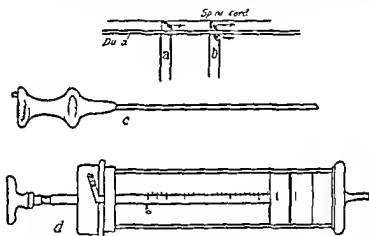


Fig. 65—*a* Correct angle of needle tip *b* faulty tip which permits escape of injection outside of dura *c d* needle and syringe used by author

platinum is 10 cm. in length and about $\frac{1}{4}$ cm. in thickness. It is provided with a well fitting stylet so as to prevent clogging of the lumen when introduced. The point is very sharp and the length of the point is only about $\frac{1}{4}$ cm. A sharp point will pierce the skin and penetrate the dura painlessly, instead of pushing the latter in front of it and so causing failure. If the point of your needle is too long it may only partially enter the sac, spinal fluid will escape causing you to think you are within the sac but when you inject the anesthetic solution most of

For operations on the legs up to the groin the amount is 1 grain.

For low abdominal operations, below the transverse colon, inject between the third and fourth lumbar vertebræ; amount 1 grain, mix with about 4 c.c. of spinal fluid, making a total of 7 c.c. This brings our solution high enough to anesthetize the tenth intercostal, which innervates the peritoneum immediately



Fig. 66—Needle inserted between third and fourth lumbar vertebræ at end of thumb. Thumb rests on tip of the third spine. Insert shows needle perforating dura mater.

above the navel; the eleventh, immediately below the navel; and lower down, the eleventh and twelfth intercostal nerves.

For high abdominal operations, above the transverse colon, inject between the second and third lumbar vertebræ; amount $1\frac{1}{2}$ grain, mix with 7 c.c. of spinal fluid, making a total of 10 c.c. This brings our solution high enough to obtain complete loss of sensation of the serosa in the epigastrium, which necessitates

the back is aseptized with benzine and 4 per cent tincture of iodine which after five minutes is washed off with 95 per cent. alcohol. The field is draped with sterile towels the operator after observing strict aseptic precautions identifies his landmarks. This is done by using as our guide a line drawn between the highest points of the iliac crests. This line crosses the middle of the fourth lumbar vertebra.

The spinal cord ends in the *conus terminalis* from which springs the leash of nerves called the *cauda equina* at the lower border of the body of the first lumbar vertebra. We select a site below this point in order not to injure the spinal cord. Between the first and second lumbar vertebrae the nerve roots are arranged in right and left bundles with a small space from 2 to 5 mm. between them unless you strike this space you will inject into this bundle of nerves on either side and you get a unilateral anesthesia which is deeper for the leg than the region above upon which you desire to operate. When this occurs the patient will jerk his leg and complain of pain. Below the second lumbar vertebra the nerve roots are more evenly spread out filling the whole space but leaving free room for the solution to filter through when you enter here the *cauda equina* is generally pushed aside.

The site of puncture depends upon the height of the anesthesia required when we require a low anesthesia we inject between the fourth and fifth and when a high between the second and third lumbar vertebrae. In children we never inject higher than below the third lumbar on account of the cord ending opposite the third lumbar vertebrae. The height to which anesthesia extends depends further upon the amount of the solution—the greater the amount the higher the anesthesia and upon the amount of the drug—the larger the dose the higher the anesthesia. We increase the amount of our solution by with drawing and mixing sufficient cerebrospinal fluid to equal the amount required as follows.

For perineum and external genitalia inject between fourth and fifth lumbar vertebrae amount $\frac{3}{4}$ grain no cerebrospinal fluid.

CLINIC OF DR THOMAS J WATKINS

ST LUKE'S HOSPITAL

POSTOPERATIVE CATHETER CYSTITIS (USUALLY MIS TAKEN FOR CYSTITIS DUE TO INCREASED RESID UAL URINE)

Summary Frequent occurrence of cystitis after pelvic operations history of case
work of Dr Arthur H Curtis on importance of residual urine in gynecologic
cases after treatment of the bladder in gynecologic cases

November 21 1918

THE frequent occurrence of cystitis after pelvic operations especially after extensive plastic operations involving the anterior vaginal wall makes the subject of great importance From the observation of a considerable number of cases I am firmly convinced that the so-called postoperative catheter cystitis does not usually result from infection from the catheter but from the presence of an increased amount of residual urine The following case illustrates this contention

Mrs E aged forty five consulted me for uterine prolapse a large cystocele and lacerated perineum The uterus was about twice normal size She had the usual symptoms of prolapse and also had some vesical irritability Examination of the urine showed cystitis and the use of the catheter immediately after micturition showed on an average of $1\frac{1}{2}$ to 2 ounces of residual urine

The lesions were corrected by a modified transposition operation A high amputation of the uterus was made through an incision in front of the cervix The resulting stump was firmly sutured to the fascia underneath the trigone of the bladder The sutures were placed so that when tied the urethra was drawn

a paralysis of the sensory nerve roots in the subarachnoid space up to a level with the spinous process of the sixth dorsal vertebra.

We do not employ spinal anesthesia as a routine but only in cases where a general anesthetic is contra indicated and where a local does not answer the purpose. During the recent epidemic of influenza we have had emergency cases where we were obliged to operate while the patients were in the midst of a pneumonia. One particularly interesting case of this character occurred in a woman of twenty six, pregnant full term. She was taken ill with influenza pneumonia and on the third day labor began with terrific hemorrhages due to placenta praevia. A cesarean section under spinal anesthesia was performed while she was having a temperature of 104.4° F. The baby lived and the mother made an uneventful recovery.

daily until the amount of residual urine becomes normal, which is $\frac{1}{2}$ to 1 dram. Instillations of silver are used after catheterization, commencing with a weak solution of $\frac{1}{4}$ of 1 per cent, and gradually increasing the strength of the solution should progress not be favorable. Benzoic acid, 5 grains four or five times daily, is given in case the urine is neutral, and as soon as the urine becomes acid urotropin is ordered commencing with 5 grains three times a day, and increasing the amount 5 grains each day until formalin appears in the urine. Then the amount is again diminished so that a weak reaction of formalin is obtainable. In case the urotropin produces an acute irritation it is stopped at once and large doses of sodium citrate are given until relief is obtained. The result of this treatment has been that the patients when finally discharged are cured of the cystitis. In occasional instances it is necessary to keep up some bladder treatment after the patient has been discharged from the hospital. We believe it highly important that such cases be kept under observation until the cystitis is completely cured for reasons which are obvious. We are convinced that chronic cystitis frequently resulted and persisted for a long time in many gynecologic cases with the treatments which were formerly employed.

upward to its normal location. The anterior lip of the cervix was amputated. The redundant tissue in the flaps of the anterior vaginal wall were resected and closure was made care being taken to approximate firmly the fascia underneath the bladder. Some interrupted sutures were used to guard against the retention of much wound secretion, which in such a case would be certain to become infected and produce fever. A firm perineal body was made.

This operation resulted in considerable traumatism to the bladder which was already infected and which had defective muscles as the result of having been overstretched and displaced. Following operation she had a partial bladder paralysis, which is common and should be expected in such a case. Although she was able to pass some urine it was nearly two weeks before the residual urine became normal in amount.

My attention was drawn to the importance of residual urine in many gynecologic cases by the work done by my associate Dr Arthur H. Curtis which was reported in a paper presented to the American Gynecological Society in Philadelphia in 1918. His contention was that the use of the catheter in normal bladders did not result in cystitis; that bacteria were commonly passed through a normal bladder without producing cystitis; that experiments demonstrated that pathogenic bacteria could be passed through a normal bladder without producing infection.

For the past two years we have given careful attention to the question of increased residual urine with the result that post-operative symptoms and findings are almost invariably proportionate to the amount of residual urine which the patient carries. The fact that bacteria are often eliminated through the kidneys means that bacteria very frequently travel through the bladder cavity and in the case of the presence of a considerable amount of residual urine infection is very liable to result.

AFTER TREATMENT OF THE BLADDER IN GYNECOLOGIC CASES

It has become our custom to test for residual urine as soon as bladder symptoms develop and to catheterize at least once

CLINIC OF DR. A. J. OCHSNER

AUGUSTANA HOSPITAL

HYPOSPADIAS

Summary Technic of operation for the cure of hypospadias

THE first step required in the operation for hypospadias consists in making a perineal fistula for the introduction of a catheter into the bladder in order that the plastic work will not be contaminated by urine. This portion of the operation is performed by introducing a steel sound through this opening of the urethra (Fig 67 1 A), and carrying it into the perineum (Fig 67 1 B). The skin and superficial fascia are retracted and the sound is pushed against the perineum pushing forward the urethra (Fig 67 2). A longitudinal slit is then made in the urethra and through this a catheter is introduced into the bladder. This catheter is held in position by a piece of rubber drainage-tube drawn over it, which in turn is fixed by means of a suture (Fig 67 3). In this manner all the urine will be emptied through the catheter and the field of operation will be entirely free from this source of contamination.

In this case the urethra ends at the scrotum. There is a marked degree of shortening of the penis because of a band of connective tissue extending from the lower end of the urethra at the base of the scrotum up to the meatus. In order to overcome this deformity it will be necessary for us to loosen this entire band by cutting its attachment at the lower edge of the band and freeing this connective tissue entirely. Unless we succeed in freeing this connective tissue, whatever else we may do will not be of much avail.

An incision is then made (Fig 67, 4) and the flap is reflected laterally leaving a raw surface underneath. Now we have

loosened this adhesion, and you see that there is now considerable lengthening. The only way I can see to obtain an efficient urethra is by making use of this preputial tissue. The next step consists in securing tissue for the construction of a new urethra from prepuce (Fig 67, 5).

In order to make a urethra that will be satisfactory to him we must have a very large flap (Fig 68, 6) and we must fold this in with fine catgut Lembert sutures, preferably interrupted (Fig 68, 7-8). These sutures must under no condition perforate the mucous membrane. They must come down to the mucous membrane and then fold the mucous membrane inward, so as to make a perfect channel, which will be much larger than we should wish ultimately, but we must bear in mind that there will be some edema, and that unless we have a superabundance of tissue the canal will not be large enough in the end.

The glans should be transfixed freely at this point (Fig 68-8), because in doing this I think it will be possible to fold in this long urethra in such a manner that there will be no danger of necrosis from pressure. That is a matter of which we have to be very careful. If we get pressure necrosis here our whole flap will slough off and our labors will have been in vain. Now I have a space here through which I can pass my fingers without any tension. I believe that I will be able to carry this newly formed urethra through this opening in the same manner by holding the edges of the wound in the glans apart by means of fine forceps (Fig 68-8). The line of incision from which the prepuce has been separated is next sutured to the raw edge in the glans (Fig 69, 10) and a few additional sutures are so placed as to unite the remaining portion of the incision in the glans with the newly formed urethra (Fig 69-11). The end of the urethra at the edge of the scrotum is then carefully dissected out, and the free end thus formed is attached to the free end of the newly formed urethra, which has been carried down through the slit in the glans (Fig 69, 12). The union between these two ends is accomplished with fine chromicized interrupted catgut sutures (Fig 69, 12). Now it becomes necessary to free the skin on either side, making use to as great an extent

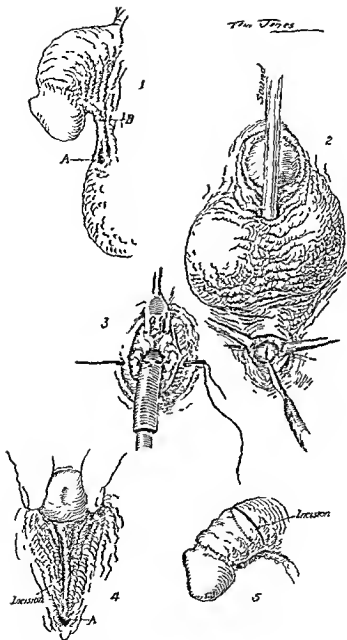
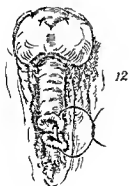
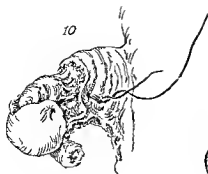


Fig 67—Operation for hypospadias.



To Jones

Fig. 69—Operat on for hypospadias

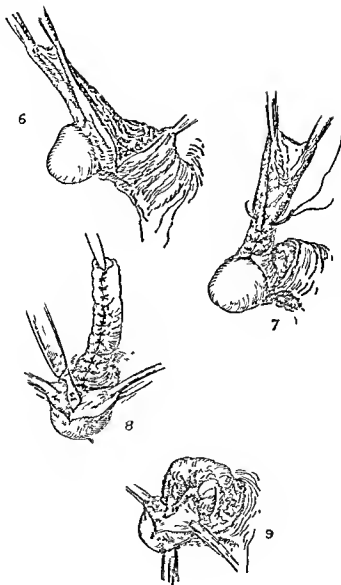
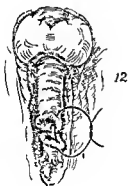
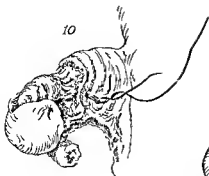
*Ten Dines*

Fig 68—Operation for hypospadias



Terr Jones

Fig 69—Operation for hypoplastic as

as possible of the flap which was shown in Fig. 68-6 care being taken to secure an abundance of the free skin with which to cover the new urethra (Fig. 69-13). These newly formed flaps are then sutured over the newly formed urethra care being taken to have them sufficiently loose so they cannot possibly give rise to pressure necrosis. The edge of the glans is sutured to the edges of these flaps so that the entire operation is complete with the exception of the construction of a meatus. This may be accomplished immediately by making a longitudinal incision through the portion of the newly formed urethra which has been drawn through the glans or this portion of the operation may be postponed until a few days later. Ordinarily it is a good plan to make this opening immediately and to carry about four strands of silkworm gut through this opening down to the urethrotomy opening and permitting them to pass out just above the drainage catheter in order that any accumulation of serum in the newly formed urethra may readily be drained away, and in order to prevent possible pressure necrosis which might result from an accumulation of serum. This operation is practically the one which was first described by Carl Beck some twenty years ago. It has proved very satisfactory in cases in which there was present a large prepuce and in which there has been sufficient amount of loose skin to cover the newly formed urethra.

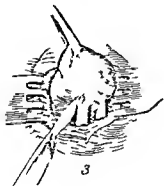
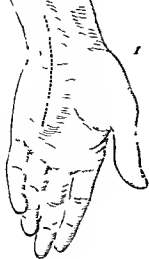
A simple vaselin dressing is applied in order to prevent the child from soiling this wound surface. The child is kept in bed and given a moderate diet and in order to prevent an accumulation of phosphates in the urine it is well to give a glass of distilled water with from 3 to 5 drops of dilute hydrochloric acid every three hours. The superficial stitches may consist of silk or fine catgut or preferably of horsehair.

EXCISION OF GANGLION FROM HAND

Summary Patient presenting a ganglion along flexor tendons of forearm extending into palm of hand treatment of small ganglia operation in present case—findings

THIS patient has a ganglion along the flexor tendons of the forearm extending into the palm of the hand. Pressing upon the palm of the hand causes the swelling in the wrist to increase. Apparently a number of tendons are involved. The ganglions in the palm of this hand cover approximately one third of the palm. Ordinarily we try to dissect out the entire ganglion. In the smaller ganglia we sometimes puncture the swelling with a trocar and express a gelatinous fluid and then inject a few drops of 30 per cent phenol in glycerin and dress the hand with a tight compress over which a bandage is applied. Very frequently with small ganglia that method will succeed. In large ones it usually does not succeed. We must dissect out the capsule. That is what we are going to try to do here. Of course when it comes to the annular ligament it is difficult to make sure that we have removed the entire capsule. In case of doubt it is best to cut this ligament and to suture it with fine chromic catgut after dissecting out the ganglion.

It is in this case that we have one of those very rare lipomata that extends down into the palm of the hand. It is quite possible that this may be one of those instead of a ganglion. You see as I cut down on it that this swelling is covered with a little area of fat which gives it the appearance of a fatty tumor but it is in reality a ganglion. Of course we have to be very careful here. It is to be hoped that we can dissect this out without breaking it. I think this is full of rice bodies. We will make stained microscopic sections of these rice bodies because they are liable to contain tubercle bacilli. Rice bodies are little bodies about 5 mm in diameter and 1 mm thick that some times contain tubercle bacilli.



Tim Jones

FIG. 70—Excision of ganglion from hand

This upper part extends into the wrist. We will dissect out as much as we can from this side and then we will attack it from above. At times it is difficult to find the ganglion from above but in this case it is not at all hard to find because after incising the skin and fascia it is plainly in view. In order to make a complete excision in this case I find that it will be necessary to cut through the annular ligament. After removing the ganglion we remove the Esmarch constrictor to control any points of bleeding before suturing the wound.

Now we will apply a few fine catgut sutures to unite the subcutaneous tissues. We will then apply a large pad and then fix the wrist and hand by means of a splint to keep the fingers straight while the wound is healing.

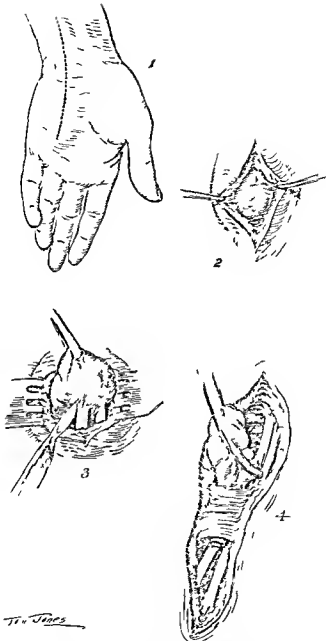


Fig 70—Excision of ganglion from hand

CLINIC OF DR MAURICE A BERNSTEIN

WESLEY MEMORIAL HOSPITAL

TALIPES CAVUS (TALIPES PLANTARIS, CONTRACTED OR HOLLOW FOOT)

Summary A type of foot deformity not recognized in the early stages historic sketch four types of acquired hollow foot report of 3 cases—operative technique bibliography

THE cases which I desire to present this morning belong to a type of foot deformity which is not recognized in the beginning stages owing to the fact that the symptoms are not sufficiently marked to be incapacitating. Later on when discomfort manifests itself relief is sought by specially fitted shoes. The condition however becomes progressively worse and the surgeon is finally consulted. This deformity is known as talipes cavus talipes plantaris contracted or hollow foot.

The condition was first described by Shaffer and later by Fisher both of whom give an extensive description of the deformity. The title of Shaffer's paper 'Non deforming Club foot' is misleading as you will see from the cases here presented and from the observations of other writers demonstrating that the bony structural change of the foot is quite significant when it is fully established. Fisher commenting upon the deformity says 'A varus foot when the distortion is fully developed is a somewhat complicated piece of abnormality.' According to Dubruch the first precise knowledge of hollow foot was gained from the work of Duchenne of Boulogne who described its genesis and pathologic physiology. He showed that there were four

Correction In Dr Bernstein's clinic which appeared in the October Number p 111 3d paragraph 18 lines from top of page sentence should read case of paralytic arsis instead of valgus

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THE cases which I desire to present this morning belong to a type of foot deformity which is not recognized in the beginning stages owing to the fact that the symptoms are not sufficiently marked to be incapacitating Later on when discomfort manifests itself relief is sought by specially fitted shoes The condition however becomes progressively worse and the surgeon is finally consulted This deformity is known as talipes cavus talipes plantaris contracted or hollow foot

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types of acquired hollow foot each having a different etiology as follows

1 Hollow foot due to contraction of the *peroneus longus*. This does not cause contracture of the toes

2 Hollow foot due to paralysis of the sural triceps which does not cause contracture of the toes

3 That due to paralysis of the interossei of the abductor and of the short flexor of the large toe. Here there is a concomitant contracture of the toes. When these muscles are paralyzed there results by virtue of the loss of their tonicity a contraction of the extensors of the toes. These in reality act only on the first phalanges and therefore pull this phalanx up on the dorsal surface of the metatarsal

4 In the contracted form of equinus hollow foot the equinus is the starting point of the deformity

Whitman in describing this condition says that there are two varieties first the simple hollow foot perhaps hereditary in origin and becoming exaggerated when the individual wears a high heeled shoe. The deformity is brought about in this case by a habitual plantar flexion of the foot. The other type is secondary to a transient form of anterior poliomyelitis or neuritis in early childhood. He calls the primary form *talipes arcuatus* and the secondary type in which the former is combined with limitation of the range of dorsal flexion at the ankle joint *talipes plantaris*

The etiology of this condition is not definitely established. It is assumed by most authorities that the condition is the result of a mild attack of poliomyelitis anterior which is not recognized until the deformity manifests itself. The pathology also is not very satisfactorily explained. Broca who made a complete dissection of a foot in a case of talipes hollow foot found the following pathologic changes. The right sural triceps was almost completely degenerated. The three muscles of the deep bed of the posterior region were attacked to a lesser degree a precise amount of the muscle being fatty and showing yellowish streaks in the middle of the healthy fibers. This was especially marked in the *tibialis posterior*. The *peroneus longus* was markedly im-

paired especially in the interior bundle the peroneus brevis and tibialis anterior being healthy. No alteration was found in the plantar muscles of the foot. The concavity of the feet was brought about by contraction of the plantar fibrous tissue. All the plantar ligaments of the foot were found shortened and contracted especially the calcaneocuboidal ligament.

Binet and Heully and Bouvier lay stress on the bony structural changes of the foot. This view is emphasized by Fisher who says that during the period of existing weakness of the flexor muscles of the foot the front part of the foot becomes slightly depressed at the transverse tarsal joint the cuboid and scaphoid bones falling down from the os calcis and astragalus and carrying with them the cuneiform bones metatarsals and phalangeals. The depression of the front part of the foot causes an approximation of the heel and toes with shortening of the sole. The plantar fascia therefore becomes secondarily contracted. Perkins gives as the pathogenesis of this condition paralysis of the interossei muscles (Duchenne) and second weakness of the peronei muscles (Golding and Bird).

It seems therefore to be the consensus of opinion that the development of this condition is the result of paralysis of the interossei and lumbrical muscles with a contraction of the plantar fibrous tissue and concomitant contraction of the extensors of the toes. The feet do not as a rule look badly. They are in fact looked upon as being well shaped but when an imprint is taken of the foot it is noted that there is a great loss of treading surface. This loss is due to the presence of several small bands of contracted fascia stretching like bow strings across the sole of the foot which prevents it from spreading when placed upon the ground. In the normal foot the two poles of the longitudinal arch separate when the individual puts his weight upon the ground. There is considerable elasticity of the foot as a result of this spring like action. When the plantar tissues become contracted the normal elasticity of this part of the foot is lost so that the individual walks with a stilt like gait coming down upon the heel and the ball of the foot at the same time.

CASE I—The first patient is a young man eighteen years of age. At the age of twelve years he had poliomyelitis and since that time his feet have remained weak and have gradually become stiff. He comes to the Northwestern University Dispensary for relief of pain in his legs and ankles. His feet burn and perpire, and calluses have formed on the bottoms which make walking very distressing. He says that he has difficulty in finding shoes to fit him.



Fig. 1. Shows contracture of all the extensor tendons of the 4th abduction of the little toes. The extensor hallucis stands out as prominent pushing the large toe out and makes the condition even more pronounced.

On examination we find both feet deformed (Fig. 1). The feet are inverted and abducted; the arches are elevated, in-step arched, and the toes contracted in the extended position; the large toe assumes the shape of a hammer toe. Calluses are found on the bottoms of the feet over the metatarsophalangeal articulation. There is a marked protrusion over the in-step. When we ask him to flex the toes he is able to do so to a very slight degree. When we depress the transverse arch he can flex the toes more readily. When we ask him to extend the toes they

assume an angular position. He is unable to extend the foot on the leg to the normal range of motion. The extensor tendons of the toes, *extensor communis digitorum*, are contracted, pulling the toes up and giving the foot the appearance of a "claw-foot." The *extensor longus hallucis* on the left side is very tense and shortened, abducting the toe so that the metatarsophalangeal articulation assumes the character of a bunion. You can see how the tendon of the little toe is contracted, subluxating the joint. There is also a well formed corn on the upper surface of the toe which has given him considerable distress. The *peroneus tertius* is contracted. This is perhaps due to the filament which passes to it from the extensor of the little toe. There is considerable loss of extension at the ankle joint.

He has difficulty in getting shoes which are high enough over the toes. He complains of cramping pains in the calf muscles. After walking long distances the muscles in the calf twitch so that he cannot find a comfortable position for his limbs at night. He has a peculiar gait, more or less shuffling in character.

I am going to cut the plantar fascia close to the os calcis and attempt to correct the deformity by extending and everting the foot. I shall also do a subcutaneous tenotomy of all the extensor tendons of the toes. In doing the tenotomy I use a long bladed thin tenotome. A small incision is made over the middle toe, the tenotome is inserted and all the tendons are cut through this one opening. Most operators make an incision over each tendon but this is not necessary since all the tendons can be reached through one incision. One silk suture is employed to close the skin incision. The wound is covered with a small dressing and a plaster cast is applied, extending from about the middle of the leg down to and including the toes. While the cast is being applied the assistant makes pressure with his thumbs over the transverse metatarsal arch so that after the cast sets a convexity is produced over that portion of the foot forcing the arch up and straightening the toes.

The patient will be permitted to put weight on the foot about the third day and at the end of a week the cast will be removed and the patient allowed to walk. As soon as it is expedient

metal plates with a convexity over the ball of the foot will be inserted in his shoes. It is important to instruct these patients regarding the wearing of proper shoes. It is also important not to rely entirely upon the operation for ultimate cure. It is necessary to stretch and massage the toes and the foot for some time after the operation. If the correction following the simple means employed in this case is not complete it will be necessary to forcibly correct the foot with a Thomas wrench. One must be certain that all the contracted tissues on the sole of the foot



FIG. 72.—Typical hollow foot showing marked elevation of longitudinal arch with contraction of the phalanges. Notice the prominence of the metatarsophalangeal articulation of the large toe.

are cut before the forcible correction is attempted. After cutting the inner portion of the plantar fascia the foot can be forcibly extended. It can be seen that other fibrous bands are

also to be cut. In the simple contracted foot manipulation and, usually, individual the foot is pliable and yields to manipulative redressment more readily than does the foot of an adult.

CASE II.—This boy is ten years of age. When he was four he had an acute attack of a febrile condition which was dia-

nosed poliomyelitis. It left him with a weak right foot and a distinct limp. While he can run and play without much impairment of gait, his foot troubles him after overexertion.

On examination we find the longitudinal arch elevated and the toes contracted prominently when he extends his foot. The

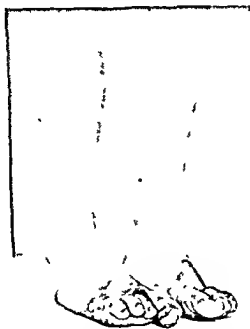


Fig. 73—The right foot is abducted and slightly inverted. It can be seen that the toes do not touch the ground. The transverse arch is broken down so that the patient's weight is thrown upon the heads of the metatarsal bones. Notice that the large toe is abducted, pushing the second toe up.

metatarsophalangeal articulation of the large toe is thickened and prominent on the plantar surface. The limb is slightly smaller than the opposite one. When he walks he tilts his body forward upon the weak foot due to a lack of stabilizing action in the large toe (Fig. 72).

This foot will not be operated now. A cast will be applied

placing his foot at a right angle and depressing his transverse metatarsal arch. The cast will be kept on for about two weeks during which time he will be permitted to bear weight upon this foot. On removal of the cast a plate with the convexity over the ball of the foot, elevating his transverse arch will be worn inside the shoe.

CASE III—This man is twenty-four years old. He knows nothing about the diseases which he had when a child. He



Fig. 74—Sclerogram of Case III showing elevation of the metatarsal heads and separation of the upper surfaces of the scaphoid, astragalus and internal cuneiform bones. Notice the proximity of the metatarsal heads to the tip of the os calcis with a density of the plantar fascia. Notice also the slope of the metatarsal bones with angulation at the metatarsophalangeal articulation. This is in contrast with Fig. 73 a normal foot.

says that since childhood he has had painful feet. His feet are rigid and he has difficulty in finding comfortable shoes. He first learned of the deformity when he was rejected for active military service.

The symptoms and clinical findings in this case are the same as in the preceding one, with the exception that here the tendo achillis is contracted elevating the heel and turning the foot

into an exaggerated varus position (Fig 73) When he stands upon his feet you can see that the toes do not touch the ground The x ray picture (Fig 74) shows a marked space between the upper surface of the tarsal bones with considerable narrowing of the longitudinal arch The metatarsophalangeal articulations are sunken, with an angular position of the phalanges This is in contrast to the conditions found in a normal foot

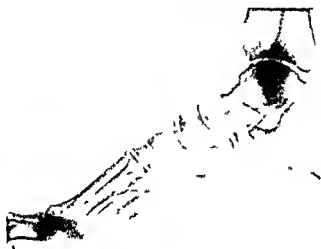


Fig 75 Skingram of a normal foot

(Fig 75) We will perform the same operation here as we did in Case I

Postscript—The two operative cases are much improved The man who was disqualified from active military duty has since been accepted

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